# Management Services in Government

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# Contents

*Page*

177 Simplification in DHSS
*D. Owen*

182 A Capital Venture—ESA's Computer Jobmatching Project
*Ms. W. E. Mauger*

192 Controlling the Telephone Costs of a Large National Insurance Company
*P. W. D. Smith*

200 The Civil Service Catering Organization
*H. A. Guest*

204 Garment Making Data—A Purpose-built Work Study Technique
*A. D. Jackson*

214 PHOBOS—Property Holdings Overseas Business Operating System
*J. M. Brown*

219 Investing in Information—Counting the Costs
*Mrs. B. M. Howard*

223 Office Machines Demonstration Rooms

224 Computer Installations for Government Departments

225 Index for 1977

# Simplification in DHSS

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'Simplify, simplify.'
H. D. Thoreau.

The avalanche of legislation which is a feature of life in the twentieth century inevitably leads to complexities in our society and adds to the burden of work which civil servants have to bear. Merely to dream of a golden age when life was simple does not ease present burdens, and yet instant total solutions are likely to be as elusive as any dream. The experience of one giant department may, however, provide a hopeful signpost to a way of achieving some modest simplification on a broad front.

The Department of Health and Social Security with over 90,000 staff and nearly 600 local offices has a complex web of procedures. It has to administer so many different benefits and to process such a large number of claims that it is not surprising that its staff has found it increasingly difficult to cope with both the volume and the complexity of the work it has to undertake. The task is made more onerous by the fact that the structure of social security benefits is constantly changing. In 1971 alone, for example, four new benefits were introduced.

Since then, four further benefits have been added to the range. The Family Allowances system has also been replaced by Child Benefit, which took in some three million extra families with one child who did not receive Family Allowances and, by periodic uprating, is gradually replacing the system of income tax allowance for children. An additional premium for one-parent families has also been introduced, and the Department is now preparing for the introduction of the 'New Pensions' provided for in the Social Security Pensions Act 1975. Contributions will be changed from April 1978 and the first new pensions will be paid in April 1979.

Apart from the introduction of new benefits, other tasks have been imposed from time to time, such as the issue of butter and beef tokens and the payment of Christmas bonuses. The increase in discretionary payments under the Supplementary Benefits Scheme has been associated with an increase in the complexity of the criteria governing them. Overlap problems have brought complications, e.g. the Housing Finance Act of 1972, which introduced rent rebates and allowances, has affected Supplementary Benefit assessments which include additions for rent. Most of the changes, and there have been many others, have

involved altering and developing procedures, with the result that instructions flow from Headquarters to local offices in such volume that it now takes a large cupboard to house a complete set.

Against this backcloth the Department has readily recognized the need to achieve simplicity in administration, and it has established machinery for assessing the operational consequences of all new work proposals, and experiments are constantly being undertaken. One such measure was the combining of payments of Retirement Pension and Supplementary Pension into one book when the claimant was entitled to both, and the Department is currently experimenting with a similar combination of Sickness Benefit and Supplementary Allowance payments. The Staff Suggestions Scheme has also been a source of many ideas for the simplification of work, although only a small percentage of staff have contributed.

By 1972, however, the pace of change and the general pressure of work led to a new approach to the problem of complexity in the social security field. Processes were complicated and there was too little time for proper thought to be given to them. Because they were busy coping with the flood of new instructions and perhaps because of a little inertia the people who had to operate those procedures did not express their criticism. It was therefore considered necessary to discover a catalyst for thought. Hence, by agreement between the two Sides of the Departmental Whitley Council a Joint Working Party was set up with the following terms of reference:

> To examine the possibilities of simplifying the methods of work and procedures with a view to reducing the burden of work in regional and local offices.

The work of this group was made subject to the general oversight of a Steering Group chaired by a Parliamentary Under Secretary of State.

The Working Party, under the chairmanship of a Deputy Secretary, comprised three Under Secretaries, an Assistant Secretary, a Regional Controller and one SEO (as Official Side Secretary) and eight representatives of the Staff Side. In a circular to all staff announcing its formation it was stated that the Working Party would be looking for substantial modifications of practice which could bring worth-while relief to staff in local and regional offices. The fact that a particular proposal might entail a change in policy, and possibly legislation, would not necessarily rule it out of consideration.

The first task was to examine as many ideas and suggestions as it was practicable to collect, and to establish an order of priority for studying those which appeared most likely to yield significant benefits. Careful selection and ordering of matters for study were undertaken so as to achieve tangible results as soon as possible. Although the Working Party concentrated mainly on proposals offering a prospect of large savings of staff effort, it did not exclude from consideration suggestions for small changes which might be introduced quickly and economically.

Information was collected in a variety of ways. Staff at all levels were encouraged to come forward with suggestions which would identify problems and, where possible, provide solutions. It was, however, recognized that in many instances officers would not be in a position to give more than a broad indication of the lines along which a solution might be sought.

In the first instance, Regional Controllers were asked to put forward views on the areas of social security which would be most likely to repay early consideration. At the same time appropriate Divisions in Headquarters examined the matter from their particular points of view. Inspectors from Headquarters visited a representative selection of local offices (agreed with the Departmental Staff Side) as another means of determining likely subjects for consideration. Every member of staff in those offices was invited to make suggestions, and discussions were held with senior officers in Regional Offices and with Regional Staff Sides. The Staff Side took separate steps to provide all social security staff with an opportunity of putting forward their views for consideration by the Working Party. In addition, a general invitation was made to all members of staff (in the circular announcing the exercise) to send any proposals they might have to simplify any part of the social security system direct to the Secretary of the Working Party.

The announcing circular explained that the arrangements were not intended to preclude the submission of staff suggestions in the ordinary way, but it was pointed out that some of the ideas put forward for consideration by the Working Party might not be accompanied by suggested solutions or might raise questions of policy which would make them ineligible for consideration under the Staff Suggestions Scheme. An undertaking was given to forward to the Departmental Staff Suggestions Policy Committee any suggestions adopted by the Working Party which would have been eligible for consideration under the Staff Suggestions Scheme.

About 8,000 suggestions were submitted to the Working Party, but many of them duplicated each other. Although there are a few simplification proposals outstanding, the 8,000 were whittled down to 620 separate ideas deserving serious consideration. Of these, about 200 have been adopted, and some 70 are still being examined. Some of the ideas adopted were received along the management line, while others came from staff members. One of the former resulted in the abandonment of a procedure whereby rents of Supplementary Benefit claimants were met by a combination of the benefit and rent rebate/allowance. A simpler procedure, whereby rent is now met entirely through the benefit, has saved about 30,000 man days per annum. An example of an idea submitted along the 'staff' line was one (received from ten separate officers serving as far apart as Penzance and North Shields) which led to an amendment of the regulations governing the time limits for Maternity Benefit claims. Previously, Maternity *Grant* could not be claimed until nine weeks before the expected date of confinement, whereas

Maternity *Allowance* might be claimed fourteen weeks before this date, thus involving two separate claims. Now, all Maternity Benefit claims may be made from the fourteenth week, and only one claim needs to be made. This has achieved a saving of 6,167 hours of staff time, 185,000 forms and as many franked labels, valued in total at nearly £25,000 annually.

The main aim of the exercise was to save work, but if a process is made simpler it may well become cheaper: staff time may be saved, postage reduced, printing and stationery costs cut. When these elements are present, we obtain not only some relief from the incubus of work pressure, but a bonus by way of financial saving. Savings provide a convenient measure of achievement, but they are not the only yardstick. While it is true that not all the ideas submitted have produced quantifiable savings, they may nevertheless have made worth-while contributions in the battle against complexity. Of the 200 adopted, 60 were referred for consideration for award under the Staff Suggestions Scheme, and these achieved savings of the order of £360,000 in the first year of implementation alone. For the remaining 140, figures recording savings are not readily available, but it can be claimed for one idea alone that the annual savings were about £500,000.

Initially the Working Party was primarily concerned with examining the many suggestions for simplification submitted by individuals, but, as this task neared completion, the Working Party became less involved in considering particular suggestions and more in exploring the scope for simplification in particular problem areas. It will have a continuing role in attempting to ensure that changes in the social security system do not lead to unnecessary elaboration and complexity. Ideas for simplification from individuals on specific topics are still welcomed, but these are now required to be submitted via the appropriate Staff Suggestions Committee in accordance with the normal rule. An undertaking has been given, however, that if a suggestion proves to be outside the terms of the Staff Suggestions Scheme it will be passed to the Working Party for consideration. Provided, therefore, that the suggestion is supported by arguments demonstrating its likely advantages, no officer needs to feel deterred from submitting a suggestion for simplification solely because he cannot offer a complete solution to the problem or because the suggestion raises questions of policy.

The Simplification Working Party can claim to have simplified departmental procedures, to have eased the work burden, to have achieved economies, to have brought about greater staff participation, and to have given the taxpayer better value and the citizen a better service. It has done these things, not by the construction of a grand design, not by super-planning, but by seeking and making use of the thoughts of its staff. These thoughts have often been directed to quite small problems, but the cumulative result has been a significant improvement. The American philosopher quoted at the head of this

article distilled his reflections on life into a brief exhortation, which might have served the Working Party as a text, but perhaps our native bard should be allowed the last word:

> 'For never anything can be amiss
> when simpleness and duty tender it.'
> W. Shakespeare.

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# A Capital Venture

## ESA's Computer Jobmatching Project

Ms. W. E. MAUGER, Employment Service Agency

Wendy Mauger is the Presentations Officer with the CAPITAL project. Previously she was a member of the CAPITAL user staff training team. —*Editor.*

### Introduction

In the afternoon of 5th September 1977 Norman Gurling, manager of P. F. Hearn and Sons at Romford, was faced with a very common problem. He needed a labourer. At around 3.45 he telephoned the ESA Job Notification Centre in Dagenham and explained his requirements. Within minutes the job vacancy details were on display at Romford and near-by Employment Offices, and at 8 o'clock next morning, when Norman arrived at his office, two applicants referred by Romford Office were already waiting to see him. One proved entirely suitable and started work immediately. Mr. Gurling's problem, like that of many employers in north-east London, had been solved with the help of the ESA's CAPITAL (Computer Assisted Placing in the Areas of London) system.

Currently operating as a pilot project at 15 ESA employment offices in north-east London, CAPITAL is a fully-interactive on-line computer system which circulates and matches jobseeker and job-vacancy information. In its design and approach to employment service work it is probably the most advanced system of its type in operation. In particular, it involves staff and public in direct interface with the computer terminal in a three-way dialogue situation.

CAPITAL is an example of the successful development and implementation of a complex real-time computer project designed to respond to a difficult business situation. This article gives the background to the design, development and implementation of the system and points out some of the management considerations involved.

### The problem

Norman Gurling's case illustrates the two main problems ESA faces in operating an employment service in the London area. Firstly, to circulate quickly information about employers' vacancies and jobseekers throughout the likely travel-to-work area; and, secondly, to match that information together.

Last year, in London, ESA's 94 offices dealt with 870,000 jobseeker registrations and 360,000 job vacancies. Many vacancies have a life-

span of only a day or two, so vacancy details must be circulated in a short time and this is difficult to more than a few adjacent offices. These details must then be kept up to date and therefore changes or cancellations must also promptly be notified.

It has been estimated that to circulate details of all vacancies to all offices in London by clerical means would require 30 million pieces of paper annually! Of course, it has never been done. But for many jobs the labour market area does cover the greater part of London. To offer a comprehensive placing service ESA must provide a means of covering this area, and linking offices to a computer system is an obvious solution. But, even if the circulation problem is solved, staff would then be unable to cope adequately with the volumes involved in matching vacancies with jobseekers. Matching people and jobs was always assumed to be an essentially intuitive operation which could only be done with the knowledge and experience of trained employment staff. Early research by the employment service on matching techniques showed that, while the final selection depended on human judgement, there were a number of critical factors which were always present in successful matches. So, using a computer for 'prima facie' matching had become a possibility.

**The design**

In 1973 PA Management Consultants Limited were commissioned to undertake a feasibility study into alternative solutions to the employment service problem in London. They were requested to compare systems and recommend one which would give economical and efficient matching of jobseekers and vacancies, and provide a more effective vehicle for labour market intelligence. The CAPITAL system was developed as the result of recommendations made in that study.

The system was designed to perform nearly all normal local office procedures, with the help of the computer and terminals. This covered the recording, matching and circulation of jobseeker and jobvacancy information, recording details of local employers as an aid to vacancy taking and automatically producing manpower statistics and management information. This approach was intended to result in the virtual elimination of clerical records held in the local offices. Staff would have access through terminals to computer stored information during the course of interviews with jobseekers and employers and be able to update it at the same time. The speed with which such information could be retrieved and processed would clearly be critical to the success of any computer approach. A message response time at terminals of less than five seconds for most transactions was considered essential to allow local office business to be conducted in an efficient way. This necessitated the use of Visual Display Units (VDUs) at each main interviewing or work position, and ensured that manually produced clerical records would not be replaced merely by sheets of computer print-out. In practice, the response time requirement has been met.

The proposed real-time system, involving as it did use of a database and teleprocessing, was clearly very advanced when considered against ADP development in 1974. Added to this, the system would be introduced into a main stream business area and would bring a radical change to the user's working environment—a transfer, overnight, from 'pen and paper' to a comprehensive on-line computer system. Against this background, it was obviously necessary to mount an experiment to prove the system design concepts. A pilot area in north-east London handling about 10 per cent of ESA London business was chosen. It was decided also that the pilot project must provide all the proposed CAPITAL facilities to allow the system to be completely tested. This would then ensure that minimum system changes would have to be made when the system was expanded throughout London.

The involvement of the user (in this case local employment office staff) in the design of the system was always considered extremely important. There was continuous close liaison with the user line management, who initially provided a small 'implementation' team drawn from London offices to advise the designers. Part of this team's task was to explain the proposals to staff in the pilot area, and receive their comments and ideas for improvements. Eventually some 200 of these staff suggestions were incorporated into the final design. The involvement of staff at that early stage was later to pay substantial dividends when training them to operate the system, because there was less adverse reaction to overcome.

Discrete areas of local office work were incorporated into individual sub-systems accessed through VDUs in an interactive situation which allowed a conversational approach to operations. The screen layouts were designed on a menu-choice principle for ease of operation by conventional office staff. The introduction of a computer system into an environment where personal relationships are important brought the fear that job satisfaction for staff might be impaired. This was deliberately combated by leaving with staff all the final decisions; for example, providing them with a short-list of vacancies for a particular jobseeker and leaving them to advise which would be most suitable. Great emphasis has been laid on the 'assisting' nature of the computer operation. It was hoped that, by freeing staff from routine clerical chores, they would be able to spend more time in counselling work which ensured the fullest use of their skills and training. Happily, this has proved to be the case.

The main difficulty in the design stage (as usual) was finalizing the system specifications in a form which reconciled the technical and user requirements. Ultimately, the continuing process of refinement had to be guillotined so that development of the programs could proceed. Nevertheless the time allowed for this phase proved reasonable as subsequently 212 system changes were made of which only 53 had a direct impact on the implementation timetable. The specifications finally agreed provided for eight on-line conversational sub-systems

accessed through VDUs and three sub-systems for on-line printing at local offices. Twelve batch sub-systems to be run in the evening at the computer centre completed the suite.

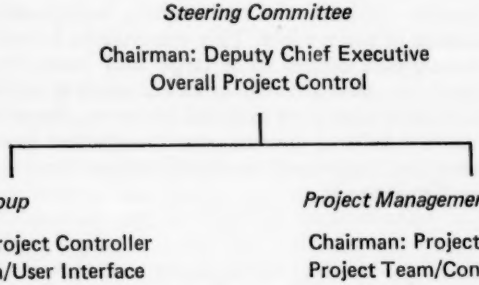
**Development**

Because the scheme would operate initially as a pilot it was decided to use a bureau service for both computer operations and program development. This would allow the scheme to be implemented with greater speed than if ESA set up its own computer centre, and would reduce costs if the pilot proved to be unsuccessful. The contract for providing the bureau service and responsibility for developing the applications programs was awarded to Honeywell Information Systems Limited in autumn 1974.

*Project control*

ESA exercised overall control of project implementation even though it involved contributions from four different organizations. To achieve this, a number of working committees were set up with two main purposes: firstly, to monitor progress regularly and report on all project activities; and, secondly, to provide a formal means of communication between the project team, users and contractors.

**The Committee Structure**




Meetings of the Steering Committee and Working Group were held monthly, and the Project Management Committee at three-weekly intervals.

The main failing of many committees—that they discuss much and do little—was avoided largely by having all agenda items covered by supporting papers distributed well in advance of meetings and then by ascribing any action items which arose to named individuals within a stated timescale.

Activities were controlled in two ways. Firstly, all activities, including those of contractors, were scheduled using PERT (Project Evaluation and Review Technique) and were reported on fortnightly to the

project controller and monthly to the Steering Committee. This close monitoring allowed all the implications of slippage in any area to be taken aboard very quickly with rescheduling of activities, where necessary, within one week. It also gave a means of predicting consequences of planned rescheduling—which proved to be particularly useful towards the end of the implementation period. Beyond this, use of PERT was instrumental in creating a team approach to the project because it made everyone aware of the significance of his own contribution to the total success of the project. Throughout the development and implementation periods PERT reported on a total of 2,000 activities of which 400 were current at any one time.

The second control, a simple reminder and reply system for individual activities arising from meetings, was applied through the Quality Control Section, who also had responsibility for maintaining standards on all documentation produced for the project. It was essential to the successful control of CAPITAL that documentation should be kept up to date and of a high quality. National Computing Centre standards, amplified and adapted to reflect the needs of real-time working, were adopted. A version control system was applied in which all papers appeared first in draft form and were open for comment and discussion before they could be issued as standard documentation. This system required considerable effort to maintain it, but nevertheless has proved entirely effective and assisted timely decision-taking.

During the early part of the development phase of the project there was considerable difficulty in maintaining communications between different sections of the project. This was mainly because the team was scattered throughout offices in a large and rambling converted fur store. It was quite often difficult to locate other members of the team, if indeed one knew that they existed! However, from September 1975 the entire team has been housed closely together in one building in Oxford Street and improved communications have had a beneficial effect on project progress.

*Equipment*

Program development has throughout used terminals (VDUs and teletypes) sited at Oxford Street. This has allowed a program testing turn-round of minutes against a minimum of 24 hours for alternative methods of remote operation. It has also meant that the testing environment is very close to the live method of operation which has been of considerable assistance in ensuring that system testing can function in a realistic manner. The system is run from a computer centre at Acton using a configuration based on a Honeywell Series 60 Model 66/40 processor which supports 150 Cossor VDU terminals at 15 local office sites. A high level of system availability is demanded because staff in local offices, who use terminals directly with the public, are unable readily to offer a service if the system goes down for a long period. Full stand-by computer facilities have been provided at Acton on a

second Honeywell machine, and switchover between the two configurations can be achieved within 15 minutes. Stand-by Post Office communication facilities are also provided. System availability since implementation has been extremely high at over 98 per cent.

*Operating software*

The system uses the Honeywell GCOS operating system to control the total machine environment. Under GCOS, on-line sub-systems are maintained by an executive transaction driver (TDS) with some 30 special ESA modifications. These include a special interface with remote terminal operations and the database controller, and meet restart and recovery needs.

*Database*

All system information is held in one integrated database controlled by IDS, Honeywell's CODASYL orientated database management system. Altogether the CAPITAL system handles about 140 million characters of data. The database design is centred around three main constituents—local employment office, jobseekers and job vacancies. Ancillary records for submissions, matching, fixed data and terminal management (including printing) bring the total up to 40 record types. The system supports full on-line up-dating, addition, amendment and deletion and, on average, each transaction (of which there are about 20,000 in a normal day) generates two database write requests and ten database read requests.

*System testing*

ESA's approach to implementation was that a successful take-on was more important than an earliest implementation date as any take-on problems could be very damaging both to ESA business and to staff morale. To ensure such a reliable system meant exhaustive testing and trials. System testing was performed at three levels—program, sub-system single thread and sub-system multi-thread, with Honeywell responsible for program testing and ESA for sub-system testing. The extent of pre-implementation testing—particularly multi-thread—was fully justified by the number of errors found and corrected at each level. However, even though it was realized that the requirements in the testing area would be stringent, there was still considerable under-estimation of both the time that it would take and the resources which would be needed. Much of the delay in implementing the project can be attributed to this.

To test the equipment performance a transaction profile was built to reflect expected peak-hour traffic in local offices. By using a simulation package it was possible to test transaction rates under varying loads. This proved a successful way of approaching this task and confirmed that the configuration could handle the expected peak-hour traffic rate of one transaction per second.

When all sub-systems had finally been completed there was a further period of extensive acceptance trials and simulated live working involving the whole system. The trials lasted for a period of five weeks and produced a further 150 errors for correction. These stages have been crucial for the subsequent successful working experience of the project.

Some 90 man-years of effort, split equally between Honeywell and ESA, have gone into developing the application programs which finally resulted in some 140,000 COBOL procedural statements. In the process ESA staff who had almost no experience of real-time operations have gained valuable knowledge and are now taking over the maintenance and further development of the system.

**Implementation**

Very early in the project a planning decision had been taken to implement the system in full at each office in turn rather than employ any partial take-on approach. There would be no parallel working opportunities as on one day an office would finish operations clerically, and the next day start with the on-line system. To do this required considerable support planning which fell mainly into three areas:

(*a*) Staff training.
(*b*) Local office preparation.
(*c*) Support at go-live.

*Staff training*

Staff training was undertaken entirely by trainers with a general employment background and their approach was intensely practical and application, rather than system, orientated. Staff of wide ranging abilities would have to operate VDU terminals in the presence of the public and there was apprehension both in local offices and the CAPITAL team about whether they would be able to cope and how the public would react. To allay these fears training was designed in an entirely on-line environment, and taught staff how to do their own particular job through the computer—which did not necessarily mean learning the whole CAPITAL system. A special training database was set up and early versions of the sub-systems to operate in a 'training mode' were released as soon as they had been individually tested. The priority for sub-system preparation and testing was geared to the order in which the training modules had to be run. Also terminals were set up in each local office to allow staff to continue to practise in training mode after having attended courses. This continued practice was not an optional exercise but was strictly monitored. It also provided valuable feed-back on the effectiveness of the overall approach. The total training for any individual was about three weeks, spread over three to four months before go-live. Training in this way demanded strict allocation of machine time, but also helped to test further the sub-systems.

Experience since go-live has confirmed that the training approach was right. Staff have coped well and the fears about public reaction to the system have been totally unfounded. The public has, in fact, accepted the system without any apparent concern.

*Local office preparation*

Although the system had been designed from a local office viewpoint it was still necessary to examine carefully how individual jobs in the offices would be affected and make some organizational changes. Local managers had the main responsibility for organizing their offices in the most effective way with advice from the project team. Significant changes needed were few and as far as possible were made well in advance of go-live. This allowed staff to become accustomed to their new roles before the system was introduced.

The other major task for local offices was the preparation of input documents for jobseeker, vacancy and employer records. Employer records, being the least volatile, were loaded well in advance from tapes, while jobseeker and vacancy information for each office was keyed-in to the system through VDUs in the fortnight before go-live. The input forms for these records were designed in such a way that they could also be used as clerical records and so it was possible to spread preparation over a three-month period before go-live.

*Support for implementation*

Support given to offices at the time of implementation had three main elements:

(*a*) A 'query point' was set up in the project team which any user with a problem could telephone and get immediate assistance. This facility will continue throughout live operation but is expected to be in much less demand.

(*b*) A 'Help' facility was built into the sub-systems which allowed staff who were unsure of the action to be taken to go back to a recognizable point in the dialogue and start again. In practice this facility is mostly used where staff have taken a wrong option and very few actually 'lose' themselves in the way which was foreseen.

(*c*) A 'task force' of staff experienced in both local office working and CAPITAL was put into each office in the period just before and after go-live. So well has implementation actually gone that this task force has been needed less than was anticipated and the emphasis has gone more into getting the office ready for go-live rather than helping with problems afterwards.

The first office—Romford—was taken onto the system on 3rd March 1977 and the last, Canning Town, on 9th September. By the end of the take-on period the system was handling over 22,000 registrants and 2,500 vacancies.

The take-on timetable, of one office a fortnight, was maintained without difficulty. Clearly the careful preparation of the staff, offices and system has been well worth while, and has resulted in a virtually trouble-free conversion period.

**Reflections**

The timescale for project implementation was originally planned for 21 months but actually took 30 months. The contributory reasons for this nine months slippage were many and varied but two areas stand out as significant and worth mentioning. Firstly, as already identified, system testing plans required more resources and time than anyone anticipated. Then, towards the end of the implementation phase certain key staff had to be changed. Although their replacements were as technically competent it was inevitable that they would not be completely effective until they were sufficiently familiar with the CAPITAL system to be able to cope with the more obscure problems occurring at that time. This was especially noticeable in the programming area and even now it is difficult to see any way in which this delay could have been avoided, except perhaps at substantial cost by initial double banking.

Throughout its life, CAPITAL has received from within ESA a high level of top management commitment. A multitude of problems and hurdles have been tackled, and expeditiously cleared either directly by the chairman of the Steering Committee or by consultation when requested. This appears to be a vital factor for the successful introduction of any advanced ADP system, particularly one such as this which affects a wide range of ESA activities. It is clear that successful project implementation demands the evident, active interest of top management who must be prepared to award it a high level of priority.

Commitment from staff is also important. CAPITAL has demanded from all staff a high level of motivation to overcome the inevitable difficult times before go-live, and then to maintain a good standard of performance afterwards. From project team staff it has required a flexible approach to working hours and a preparedness to work overtime and at weekends at short notice. User staff have had to face a revolutionary change in their working methods and must also be continually looking for ways to exploit the system to its full potential, so as to enable ESA to handle more job placing business, more effectively.

The benefits expected from the system are quite clear. Faster, wider circulation of vacancies with continuous matching will increase public satisfaction with the employment service and so lead to ESA attracting a greater share of the labour market.

This will result in a more cost-effective service. But also the by-products of the system—automatic manpower and management information—will enable ESA to react positively and more quickly to the prevailing labour market situation.

We can be fairly sure now that CAPITAL is a success technically

but the business impact has yet to be assessed. This will be covered by a comprehensive evaluation which will deal not only with the costs and benefits of the system, but will also assess the sociological effects on staff and the public. If the evaluation is successful it is expected that the scheme will be expanded first to London north of the Thames by the end of 1979, and then to the whole of the Greater London Area by 1981. It is a pleasing thought—despite the problems associated with project development—that in 1977, we have created a system which can take ESA operations well into the 1980s.

**Selections of articles**

Readers may like to know that selections of articles which have appeared in *MSIG* are available from the Editor. Each selection covers a specific subject-area, for example:

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# Controlling the Telephone Costs of a Large National Insurance Company

P. W. D. SMITH

In the May 1977 edition of *MSIG* we published 'Reducing Expenditure on Postal and Telecommunications Services' by Mr. A. Phillips of Civil Service Department. The article attracted wide publicity.

At the time we said we would welcome contributions to the journal based on experience in other organizations and in response we have received the following article from Mr. P. W. D. Smith, who is Assistant Manager, Personnel and Management Services Department, Co-operative Insurance Society Limited, Manchester.

We think Mr. Smith's account of the work of his Department on the control of telephone costs within CIS will be of general interest, and we are indebted to him for his help. We must point out, however, that staff in government departments should take no action to implement any aspects of the article without full consultation with Telecommunications Division (C5) of CCA, Civil Service Department.

Further to Mr. Phillips's article, readers may like to know that savings are still being reported by departments and the quantifiable figures now exceed £10 million.

—*Editor.*

## Introduction

The Co-operative Insurance Society Limited (CIS) is a large home service insurance organization with 250 district and regional offices in the United Kingdom. Like all organizations CIS needs to keep careful control over its costs. One major item of expense is the telephone bill which in 1976 totalled over £400,000 for CIS as a whole.

CIS Head Office situated in Manchester uses a PABX 4 having 32 outgoing exchange lines, 30 incoming exchange lines and 600 internal extensions, 400 of which have access to the Post Office network by direct dialling. Until recently only one private line was available connected over a short distance to an adjacent building. CIS Management Services Department began to investigate telephone costs in 1973 when Head Office was using 80,000 dialled units per week. This level of consumption represents an annual bill of approximately £125,000 for Head Office alone if current Post Office charges are used. Detailed investigation into the pattern of telephone traffic outward from Head Office has demonstrated that there are a number of significant factors which affect the size of the telephone bill, and experience has shown that it is possible to have some control over these factors. Since 1973 a number of measures have been introduced in order to try and ensure

that the telephone is not used unnecessarily or wastefully. The cumulative effect of these measures has been to reduce the consumption of dialled units by approximately 50 per cent and there is some evidence to suggest that a further reduction is possible. The graph at *Figure 1* overleaf illustrates the gradual decline in the consumption of dialled units from June 1973 to date.

**Factors affecting telephone costs**

Any attempt to control the use of the telephone in a large office or administrative environment has to contend with the problem that the telephone is a convenient, easy to use and quick means of communication. For most office workers it is far less troublesome to use the telephone than to write or have typed memoranda and letters. The fact that the telephone can also be an expensive method of communication, particularly for internal purposes between office locations, is not usually appreciated by the vast majority of clerical staff. It is unlikely that the typical office worker knows the total telephone bill for the company let alone the cost of their own calls. An important feature of most of the measures introduced at CIS since 1973 has been to draw the attention of the staff to the costs of making a telephone call, and to make them aware of the alternative forms of communication available.

The important factors which contribute to the size of an organization's telephone bill are:

(*a*) The number of calls made.
(*b*) The time of day calls are made (i.e. peak rate or standard rate).
(*c*) The call duration.
(*d*) Using the appropriate Post Office facility (e.g. private lines, out of area exchange lines, etc.).
(*e*) Incurring rental charges on necessary equipment only.
(*f*) Reducing non-business calls to a minimum (e.g. employee personal calls).

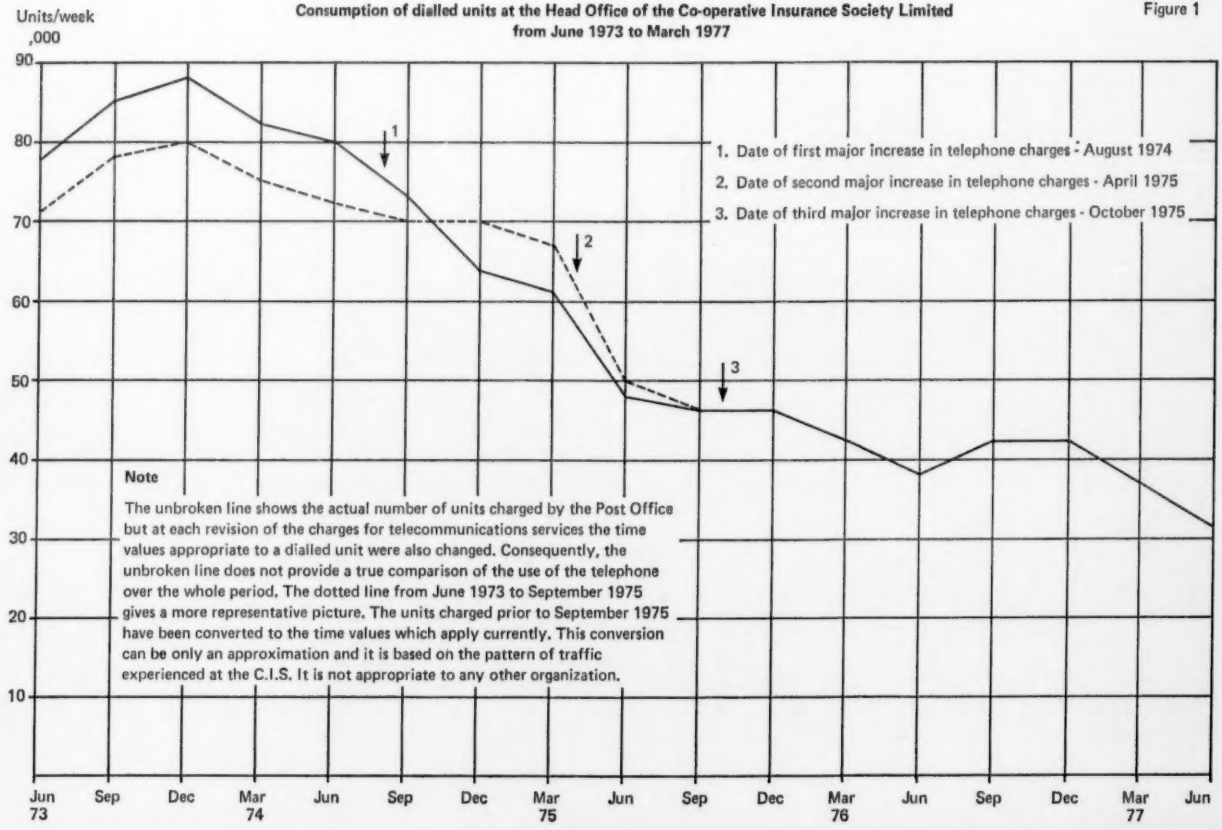
It will be apparent that if the above factors are to be controlled properly detailed information is required on the telephone traffic handled by the company's own exchange. Telephone call monitoring equipment attached to the exchange will provide detailed traffic information from every exchange line and internal extension and this type of equipment is now fitted at CIS. However, during the early stages of the investigations in 1973 only limited information was available and this was obtained by Management Services analysts and the CIS telephone operators carrying out manually recorded surveys.

**Course of investigations and measures introduced**

The early investigations in 1973/74 were concerned more with determining whether the PABX 4 exchange was large enough for CIS requirements at that time, rather than searching for ways of reducing costs. Indeed, it was decided subsequently to increase capacity by installing more exchange lines, relay sets and selecting equipment.

Figure 1

**Consumption of dialled units at the Head Office of the Co-operative Insurance Society Limited from June 1973 to March 1977**


Units/week
,000
90
80
70
60
50
40
30
20
10
1
2
3
1. Date of first major increase in telephone charges - August 1974
2. Date of second major increase in telephone charges - April 1975
3. Date of third major increase in telephone charges - October 1975
Note
The unbroken line shows the actual number of units charged by the Post Office but at each revision of the charges for telecommunications services the time values appropriate to a dialled unit were also changed. Consequently, the unbroken line does not provide a true comparison of the use of the telephone over the whole period. The dotted line from June 1973 to September 1975 gives a more representative picture. The units charged prior to September 1975 have been converted to the time values which apply currently. This conversion can be only an approximation and it is based on the pattern of traffic experienced at the C.I.S. It is not appropriate to any other organization.
Jun 73
Sep
Dec
Mar 74
Jun
Sep
Dec
Mar 75
Jun
Sep
Dec
Mar 76
Jun
Sep
Dec
Mar 77
Jun

CIS was continuing to expand insurance business and in 1974, in anticipation of the Society's telephone requirements for the next few years, the Management Services Department began to investigate replacing the existing mechanical PABX 4 by a modern electronic exchange which would provide more capacity. During these investigations the Post Office made the first of three large increases of telecommunications service charges within a 15-month period. When the second increase was made in April 1975 it was clear that CIS telephone costs would increase significantly unless action was taken to reduce use. By now the Management Services Department investigating team had more detailed traffic information available and it was clear that the proportion of calls being made in the peak period (9 a.m. to 1 p.m.) was too high. It was also evident that communicating with other CIS offices formed a significant proportion of both incoming and outgoing calls at Head Office. It was decided to mount a publicity campaign in all CIS offices drawing their attention to the costs of making telephone calls and to the alternatives available (e.g. memoranda, letters). Information bulletins were issued to all members of staff, advice was given to middle and junior management on when the telephone should and should not be used and posters were issued for display at prominent positions in the office areas. This campaign was continued well into 1976 and during this period the consumption of dialled units continued to decline steadily.

The most significant periods of decline in telephone use followed each of the large increases in charges made by the Post Office. By mid-1975 consumption had been reduced to 50,000 units a week and by the end of the first quarter of 1976 it had been reduced further to 42,000 units a week. However, not all the credit for the reduction can be attributed to the CIS publicity campaign as, during this period, the public at large must have become painfully aware of increased telephone costs. Nevertheless, it is evident from these figures that Head Office staff had acted responsibly by using the telephone less. There had been no real reduction in business activity during this period and the Society continued to expand premium income.

By early 1976 the Management Services Department had decided not to proceed with the proposal to replace the PABX 4 as the existing equipment was now more than adequate to handle the current traffic. Whilst there was no indication from the graph that the reduction in dialled units had 'bottomed out' it was difficult to see how the trend could continue when the impact of the poster campaign and the publicity connected with the Post Office increases had declined. Unless further and more permanent measures were taken to try and control telephone costs it was anticipated that the unit consumption rate would start to increase again. The Management Services Department recommended two courses of action. Firstly, that 'out of area' exchange lines should be rented from the Post Office to cater for traffic between Head Office and the CIS offices situated in four cities. Secondly, that tele-

phone call monitoring equipment should be installed. This equipment is not capable of monitoring speech but identifies and records the telephone number being called and the duration of the call.

An 'out of area' exchange line differs from the more widely known 'private wire' in that the distant end of the line is located at a Post Office exchange and not connected directly to the telephone equipment in the subscriber's premises. A telephone call from Head Office to a number in the area where the distant end of the 'out of area' exchange line is located is charged at the appropriate Post Office rate which applies to that area (i.e. most calls at local call charge rate). Conversely, calls from that area to Head Office are made by dialling the appropriate local number and a direct connection made to the Head Office switchboard in Manchester, local call charges applying again. The case for installing 'out of area' exchange lines to the four locations had become evident from the surveys of traffic patterns carried out in previous months and it was likely that a case could be made for installing similar facilities to other locations. It would seem appropriate at this stage to give some indication of the economic case for installing 'out of area' exchange lines. Unfortunately, this is not quite as easy as it may appear because there is no direct correlation between distance and cost, and the Post Office submit a quotation for each individual case. It is also necessary to know what proportion of the traffic to and from each location is carried currently through the normal Post Office public network during the peak, standard and cheap rate periods. The CIS calculations indicated that costs would break even for one line to each of the four locations if the number of minutes of telephone traffic to and from Manchester were as follows:

| | |
|---|---|
| London | 85 minutes per day |
| Birmingham | 50 minutes per day |
| Nottingham | 45 minutes per day |
| Leeds | 35 minutes per day |

In fact, telephone traffic to and from these locations is well in excess of the break-even points and two or more 'out of area' exchange lines will be provided in each case. Unfortunately, this type of facility cannot be provided overnight as a lot of planning work has to be done by the Post Office and additional equipment will probably be required for the subscriber's exchange. A delay of up to 12 months can be expected. The CIS 'out of area' exchange line facilities have not yet come into operation but it is hoped that when they do Head Office unit consumption will be reduced by approximately 9,000 units per week.

The recommendation to install telephone call monitoring equipment followed from the investigation to replace the present PABX 4 by a modern electronic exchange which incorporated this facility as a standard feature. The investigating team had followed up manufacturers' claims that this facility could reduce use of the telephone by upwards of 30 per cent and had visited UK companies which had

installed similar equipment. Whilst it was clear that these companies had made savings of this order it was by no means certain that unit consumption at CIS Head Office could be reduced much further than the level attained already. Nevertheless, the availability of this type of equipment would provide far more accurate and detailed traffic information than could be obtained from time-consuming manually recorded surveys, and the information could be used to provide detailed cost control reports for use by department managers. If the provision of this equipment simply held the unit consumption figures at the then comparatively low figure of 45,000 units per week it was considered that it would be worth while to install it. However, it was hoped that a further 10 per cent reduction in consumption could be made. The subsequent saving has more than exceeded this figure. The decision was taken to acquire telephone call monitoring equipment which cost approximately £20,000 and it was installed in November 1976. An announcement was made to Head Office staff well in advance of installation and the local trade union representatives were kept fully informed. Whilst waiting for delivery unit consumption continued to reduce and in June 1976 the number of dialled units consumed fell below 40,000 per week, but during the latter half of 1976 consumption began to rise for the first time in 2½ years.

The equipment is used to prepare detailed traffic and cost information reports for each department in Head Office. These are issued at regular four-weekly intervals. The first reports were prepared in December 1976. Three types of department telephone control report are available:

(*a*) Department telephone usage summary.
(*b*) Department exception report.
(*c*) Extension full use report.

The Department summary shows for each extension the total number of telephone calls made, calls received, the average duration of such calls and, for those calls made via the Post Office network, the charges incurred. This information is analysed further by classifying calls made into internal, outgoing local, outgoing trunk and calls via the operator. Charges are analysed appropriately over the Post Office peak rate and standard rate charging periods. Certain types of outgoing call have been classified as 'exceptions' (e.g. time, test match score, calls outside normal office hours, and calls over 10 minutes in duration) and the number of such calls made by each extension is given. The number of incoming calls which have not been answered is also shown. The detailed information provided for each extension is finally summarized into section and department totals.

The Department exception report shows for each extension full details of every exception call made and the information includes the date and time, the number called, the duration and cost, and the exception classification.

The Extension full use report is not provided unless requested specifically by the department management and it provides the same detailed information as the exception report but lists all calls made via the Post Office network.

Apart from the cost control reports another important function of the equipment is to provide information on the utilization of extensions and the distribution of telephone traffic both internally at Head Office and via the Post Office network to other CIS offices. This information is used to ensure that the Society's telephone arrangements are always maintained at the correct level and that the appropriate type of facility (e.g. more 'out of area' exchange lines) is provided where this can be justified. Some of the information given on the cost control reports can be used for traffic monitoring purposes but, in addition, the following traffic reports are available:

(*a*) Traffic analysis to nominated numbers (i.e. CIS offices, and any other number contacted frequently).
(*b*) Exchange line utilization report.
(*c*) Operator answering time report.

The results of the first six months' operation are encouraging as by March 1977 unit consumption had dropped to 37,000 units per week and by June 1977 to 31,000 units per week. The traffic reports have confirmed that the decision to install 'out of area' exchange lines in four cities was correct (in fact, the traffic to these locations had been underestimated) and that similar installations to other locations are also economically worth while. A full review of the telephone equipment available in each department will be carried out shortly using the traffic reports to assess whether equipment is needed or not.

It is now known that the PABX 4 is incorrectly graded for the current level of traffic. Grading is a term used to describe the practice of allocating exchange lines to groups of internal extensions. Most people who have little knowledge of telephone operations believe wrongly that if an exchange has, say, 32 outgoing exchange lines any internal extension with outside dialling facilities should be able to access an outside line if any one of the 32 exchange lines is free. For a number of technical reasons affecting the selecting equipment this is not the case and, consequently, groups of exchange lines are allocated primarily, but not exclusively, to particular groups of extensions. Some overlapping between groups is designed into the grading structure and it is intended that the outgoing traffic should be spread reasonably evenly over all exchange lines. If the grading structure is not matched to the pattern of traffic currently handled by an exchange some internal extensions will receive the line engaged tone far more frequently than other extensions during busy periods (even, perhaps, when some exchange lines are free) and some exchange lines may be so underutilized that they could be disconnected without any noticeable deterioration in service. At present some of the CIS outgoing exchange

lines handle less than ten calls per quarter and, as a rental of £39 per annum is paid on each line, it is proposed to dispense with a number of them when the 'out of area' exchange lines are operational.

**Conclusion**

The cost savings achieved to date illustrate the importance of controlling telephone costs. One feature which has undoubtedly helped the drive to reduce costs has been the relative stability of staff movement, particularly during the last two or three years when the economic climate of the country has reduced job-changing opportunities. Longer-serving staff build up experience and, as a result, become more competent. Administrative efficiency benefits and there should be fewer queries to be dealt with either by correspondence or over the telephone.

This article has concentrated on the work carried out at CIS Head Office but consideration has also been given to controlling the telephone costs at district and regional offices. Some of the measures described in the article (e.g. 'out of area' exchange lines) will help to reduce their telephone bills and some success has been achieved already by adopting a 'league table' approach comparing the relative performance of offices after linking the cost of telephone calls to a common factor (e.g. number of insurance policies serviced by an office). It is unlikely that permanent telephone monitoring equipment will be installed at district and regional offices because the savings will probably not be large enough to justify the capital outlay, but consideration is being given to using mobile equipment which can be taken from office to office for periodical checks to be made.

Finally, it is appropriate that some comment should be made on the commonly held belief that substantial economies in telephone costs will be made if staff 'personal calls' are controlled by using telephone call monitoring equipment. Personal calls are, of course, an unnecessary cost to a company and it is only proper that some control should be exercised. However, control should not be so rigid that personal calls are forbidden when there is a genuine need (e.g. working late, family problems) as better industrial relations are fostered by adopting a reasonable approach. Of the six factors affecting telephone costs listed earlier, reducing non-business calls to a minimum is probably the least significant of the six in cost saving terms. Most personal calls are charged at local rates and even during the peak rate period a 3p unit has a call duration of 120 seconds whereas a 3p unit for a trunk call has a duration of only 10 seconds. Personal calls probably represent only a small proportion of the total telephone bill and, if the CIS experience is typical of other organizations, it would not be worth while to install monitoring equipment solely for the purpose of reducing the cost of personal calls. No doubt some improvement in staff productivity would be gained and the savings from this aspect, if they could ever be measured, are likely to be significantly higher than the marginal reduction in the telephone bill.

# The Civil Service Catering Organization

H. A. GUEST, Civil Service Department

Mr. Guest is Chief Executive of the Civil Service Catering Organization. —*Editor.*

I last wrote about the development of the Civil Service Catering Organization in November 1974,* and I have now been asked to report on our progress and problems in the substantially changed climate of expenditure in the public service.

**Aims of Civil Service catering**

These remain unchanged, that staff should be able to obtain a good mid-day meal in pleasant surroundings at a reasonable price. However, they are inevitably more difficult of achievement since Civil Service catering has not escaped its share of inflation. This has meant that catering operations, present and planned, have to be scrutinized against strict financial yardsticks to ensure an acceptable product whilst enabling the unit to trade at or around break-even point within the approved level of subsidies. However, I and my senior management have accepted the task given to us, that catering staff employed must earn their keep through the income they have helped to earn, and the work we have done during the past 2½ years has enabled us to meet this challenge with flexibility, interest and, at times, excitement. This has been helped by the detailed progress made in all sections of the organization.

**Assessment of the market**

During the period, we have developed what we now describe as our Assessment Package. Our Sales and Marketing Director establishes the likely size of the catering requirement, and in the early stages makes proposals for varied services such as snacks, take-away, omelette counters, etc, which can be built into the equipment schedules. They use market surveys to confirm the basic tariff assumptions, and we have carried out over 40 during the last two years. This survey is then converted into customer and spending power assessment, staffing standards and viability projection. All these figures give a firm basis for management decisions and a target for achievement by operational management once the unit opens. We have also developed a whole

*'Development of the Civil Service Catering Organization' by H. A. Guest, *MSIG*, Volume 29, Number 4, November 1974.

range of promotional and advertising techniques to help us to achieve these targets.

**Operations**

A unit, once opened, is directly responsible to the Director of Operations, who, in particular, exercises great care over the total staff complement and concerns himself with all aspects of staff shortages, whether they be due to illness, security problems, or general difficulties encountered in engaging staff of the right quality. He also reviews regularly the total demand for business and produces a manning schedule based on the number of hours of work required to carry out any given task. Control is then exercised over the staff in post, which leads to tight control of the overall complement of CISCO. We obtain statistical information on the number of main meals served per full-time staff equivalent and the amount of money taken (excluding cigarettes) per full-time staff employed, and both these point to units where further management investigation is required. Thus, during the year we have been able to reduce our manning schedules where we have found that staff were not fully utilized, and I was delighted to see that, in a period of cut-back, we had a technique advanced enough to do so in a methodical and sensible manner which has had very little noticeable effect on our service to our customers—other civil servants. Equally, Operations is concerned with the unit performance in achieving its production target and the correct gross profit, and triggers off various well-established techniques where assistance, help and control are needed.

**Personnel**

We have come to the conclusion that beyond a certain stage statistical and management investigations do little to illuminate the problem of unsatisfactory operational standards in terms of performance and cash results, and it is best to look at the Staff Report and the general standard of performance of management and of staff. We believe that during the last two or three years we have steadily improved the quality of our management by a combination of regular engagement to a high standard, methodical posting and training of junior management in order to give the right sort of job experience, and increasing the management and training skills of our line management; and currently 200 out of 230 managers and some first-line supervisors have been trained as on-job trainers. We are now increasingly supporting this by training activity at all levels of our industrial grades. Management have been taught to assess the training needs of their units and to develop a training plan, and we have introduced for the first time at our level of catering a methodical system of quality and reliability control, which involves all levels of management and staff in a continuous monitoring of the standards of food we serve to our customers. We are conscious of the difficulties of maintaining consistent standards in a widely dispersed organization, and during the year have produced, with

the help of Cyril Fletcher, a particularly interesting training strip of slides and voices which graphically shows how things can go wrong and how they should be put right. This has been seen to date by some 30 per cent of staff.

**Supplies and services**

We have continued our programme of dealing with nationally nominated and sole suppliers, but have at all times retained a degree of flexibility in the purchasing arrangements both as to time and volume in a period in which food cost inflation has now risen to some 20 per cent per annum. We think we have derived benefit from this more flexible approach. In this section we have also had to cope with much increased legislation, particularly health and safety at work, both in its guidance to committees and its instructions to CISCO operating units. We have also made a determined attempt to improve the quality of our maintenance. An interesting example was a one-day check of the total readiness state of all our washing-up machines. In November 1975, only 65 per cent of the machines were operating correctly. This check, repeated in March 1977, showed an improvement to 82 per cent.

We recently checked the amount of china moved in one of our restaurants in a day, and found that it was $1\frac{1}{4}$ tons, almost wholly moved by woman-power. This demonstrates the need for the modern caterer to be both work-study minded and aware of equipment usage as much as, if not more than, the production of a complex dish with a rich sauce so beloved by the Sunday supplement and food guide writers.

To match our new concept of the fast-food snackery, we have developed prototype equipment which can be ordered as a complete package from manufacturers, and only requires connecting up without calling for time-consuming attention by various trades for final installation.

**Accounts and financial controls**

We have continued to develop our budgetary procedures because, in a period in which food and labour costs are rising between 10 and 20 per cent per annum, it would not be possible to achieve our financial targets and stay within cash limits without planning well ahead. The method of Vote-accounting does not permit us to include assumptions on future price increases to offset known or anticipated cost increases, therefore these procedures exist in parallel with the Vote.

**Field management accounts**

Probably the most useful addition to our management resources has been the development of the Field Management Accounts section. We have been fortunate enough to find some very keen people, who now form an outstanding team. Whilst they were viewed with considerable concern, not to say hostility, by operational management

when first spawned in a consultant's report, they are now in very great demand, and their technique commands great respect. Whilst they use figures initially to identify the areas of weakness, they can pinpoint the half-hour of staff time unproductively employed, or the 20°–30°F a fish fryer is below correct working temperature, leading to excessive cooking time, excessive moisture absorption, and thus low production yields. I can pay them no greater compliment than to say that, whilst I took my PhD on chips, they have now majored on milk consumption!

**Management performance**

One of the great difficulties in staff and industrial catering is to ensure that the technique and professional standard of performance of the catering management and catering staff is not blurred by the methods used by general management to subsidize the provision of food to employees. In the Civil Service the difficulty has been tackled by paying a grant to the catering operation based on a percentage of food sales; the percentage is graduated according to the level of gross profit which the unit finds it necessary to generate in order to cover its operating costs. The subsidy is at its maximum of 20 per cent of food sales where the gross profit is 45 per cent of food sales, and declines by 1 per cent for every 1 or 2 per cent drop in gross profit. This formula applies not only to CISCO restaurants but to those run by individual management committees, and is thus a flexible means of resource allocation. In addition, it provides an excellent incentive to all levels of catering management to take sound managerial decisions with regard both to controlling costs and maximizing sales.

**Advisory services**

We have continued to provide a wide range of advisory services to committees, TSA skillcentres, and museums and parks. To prove our theories, we are catering in two museums to the general public; and I am particularly proud of the catering operations at the British Museum and at the National Maritime Museum, Greenwich, which provide a pleasant, modern coffee-shop style service. All our levels of catering management have benefited from this cross-fertilization of ideas; and the fact that we have not always had full approval from the food guides is in part attributable to different standards of judgement applied to the production of food which originate in the historic setting of haute cuisine. We have now produced a manual covering all aspects of CISCO operation and are beginning to receive inquiries for the use of our full range of documentation, computer programs and management techniques.

**Current problems**

We have experienced, during the past 12 months, significant resistance from our customers to price increases which we have had to make

because of the heavy cost inflation of food and labour. It is too easily forgotten that the increase of the employer's National Insurance contribution of 2 per cent from 1st April 1977 was a genuine and onerous labour cost increase to CISCO—as it was to all other trading organizations. Where we have been able to modernize to take-away and fast-food snackery counters, business has remained buoyant and almost immune to the effects of price resistance, and it is thus clear to me that even in difficult trading conditions one can react flexibly by the intelligent use of resources as represented by capital, labour and time.

# Garment Making Data—A Purpose-built Work Study Technique

A. D. JACKSON, Home Office

Tony Jackson is Head of Work Study, Establishments Department, Home Office. He has been assisted in the preparation of this article by members of his staff who worked on the development of GMD and by others who carried out the first field applications. *—Editor.*

## The background

The reader may well wonder what the Home Office has to do with garment making. The answer is that it is a substantial industry in prisons, employing approximately 3,500 prisoners in about 70 production shops scattered throughout England and Wales. Output includes the entire range of clothing worn by male prisoners, and various items for other organizations, including Government Departments, nationalized industries, and private firms. At any one time about 25 different articles are being produced. The range of products includes shirts, pyjamas, underwear, overalls, jackets, trousers, and many others.

It is necessary to measure the work content of the manufacturing processes to provide a basis for management controls, i.e. weekly statements of output, attendance time, performance, unproductive time, and unit cost, all compared with budget, as cues for management

action. Work measurement also serves as a basis for incentive schemes, similar to those common in outside industry, for prisoners. The number and variety of products make this an extremely large and continuing work measurement task. As the reader may know, work measurement by the usual method of time study requires several periods of observation, known as 'studies', on each operation. If possible, these studies should be taken by a number of observers on a number of operators. The operation cycle is divided into parts known as 'elements'. In each study a number of cycles are observed; the observer records the time taken to complete each element as it occurs, together with his assessment of the operator's rate of working (known as the 'rating') at the time. Each recorded element time is later adjusted in respect of the rating to a common standard. The adjusted element times from all the studies are averaged to give a time for each element and thence a total job time or 'work value', i.e. the work content of the job. All this represents a lot of observations, a lot of arithmetic, and a lot of paper, but most significantly a lot of time.

It soon became clear, therefore, that there was a pressing need for a more rapid means of determining the work content of operations.

**The proposition**

During time studies on making-up operations on many different garments, it became apparent that despite variations in the sizes and shapes of components, the characteristics of material, and the types of machine used, there were certain movement sequences which tended to recur, in different combinations. This led to the proposition that if these sequences could be identified, defined, and quantified in terms of work content, they might be used as 'building blocks' to compile a description of the method of performing any operation and at the same time determine its total work content. That is something of an oversimplification, but it describes in essence the objectives of the undertaking.

It was resolved that for a new system to be faster to apply than time study would not be enough: it would have to produce results which would be just as good in respect of sensitivity and consistency as those derived from time study. The term 'sensitivity' here refers to the capability of the system to reflect a small change in an operation by a corresponding small change in the work value. 'Consistency' refers to the capability of yielding the same value for the same work when used by different analysts.

The opposing demands for rapidity in use on the one hand, and for sensitivity on the other, manifesting the familiar conflict between cost and quality, meant that the result would have to be that compromise which would give the greatest total usefulness. It would be comparatively easy to achieve rapidity if there were no other competing demand, by making the 'building blocks' (which were later called 'modules') larger and fewer. Similarly, it would be easy to achieve greater sensi-

tivity by making them smaller and more numerous, at the expense of rapidity. It was therefore apparent that considerable care would have to be taken to pitch the compromise at the right level.

In fact there were other demands too. It was important that the list of modules (i.e. 'the analysis') for an operation should be, of itself, a good description of the method. It was also important that the system should lend itself to use both by observation and by visualization. That is to say, an analyst should be able to 'read' an operation in terms of the modules either while it is being performed, as might have to be done by work measurement officers in a workshop, or by visualizing the method, as might have to be done by a production engineer, cost estimator, or designer. Furthermore, in order that the system should be more readily acceptable to users, it had to be made as easy as possible to understand, to teach, and to learn.

**The approach**

A search was made to see whether any suitable system was already available. Finding nothing which looked likely to fulfil our demands, we set out to develop a system for ourselves, which became known as Garment Making Data, or GMD.

An early decision had to be made as to whether to attempt to build the system on time study data, a great deal of which existed already, or to build it from one of the predetermined motion time systems (PMTS). The reader may be aware that these are systems in which, at the lowest level, very small human movements have been defined, coded and quantified in terms of work content. We opted for PMTS, mainly because it would enable the content of any module to be traced back to the lowest level, but also because of the lack of sufficiently precise definition of the movements to which the existing time study based data applied. Of the PMT systems we chose Methods-Time Measurement (MTM), because it is the most widely used and readily available system, and is controlled by the International MTM Directorate.

In order to identify the modules, many hundreds of MTM analyses of operations were made in a number of garment workshops. Using the experience gained while making these analyses it was possible to identify sections of analysis that described work which could form recognizable modules. It was found that many modules tended to fall into 'families', each of a general characteristic but which required finer classification and sub-classification into modules of a suitable magnitude. The work content of each was obtained from the MTM analyses.

At this stage it became clear that if the modules were to be easily identified and economically recorded by users of GMD, some simple method of labelling them was essential. To meet this need, a coding system was devised, in which classifications and sub-classifications were indicated by letters, selected for their mnemonic properties, and in

some cases the addition of one or two numbers. For example, a common family of modules is *P*lace part, identified by the letter P. Within the P family are three classifications, as follows:

PL *P*lace part to a general *L*ocation;
PP *P*lace part by *P*ositioning it to another part;
PN *P*lace part to the *N*eedle.

Sub-classification of these three is then effected by provision for other circumstances, such as the number of movements necessary to complete the module, and the distance moved. No module code is likely to contain more than five characters, and the meaning of each module code is specified. Back-up MTM analyses show the derivations of the module values, which are expressed in basic milliminutes (BMMs).

An example of a module specification is:

HT: Handle; Turn part. 25 BMMs
*Limitation*
HT, like any other H module, can be applied only 'during machining,' and when sewing has temporarily stopped.
*Definition*
HT is a sequence of movements, during machining, with the purpose of turning the part, using the needle as the axis of turn.
*Scope*
Begins: with the hand reaching (or, more commonly, the leg or foot moving) to the lever or pedal used to raise or lower the machine presser foot.
Includes: reaching or moving to and actuating the lever or pedal to raise the presser foot, turning the part to the new alignment, lowering the presser foot and gaining a new control of the part.
Ends: with the part under control ready for the next module.

Some other examples of module codes are:

| | |
|---|---|
| CT | *C*ut *T*hread; |
| DNS1 | *D*etach part from *N*eedle using *S*cissors, *1* cut; |
| GTA | *G*et *T*ool and subsequently place *A*side; |
| SB | *S*ew *B*ackstitch. |

No mention has so far been made of the pure sewing component. This had to be tackled by other means, although the same coding principle was maintained.

One group of machines which could be dealt with fairly simply comprised those with automatic sewing cycles, during which the machinist does not have to manipulate the material. These include machines for buttonholing, button sewing, bartacking, and some other processes. The sewing cycles were measured by means of a special stopwatch, and the modules were coded SA—*S*ew *A*utomatic.

However, for the more usual type of machine, where the machinist has to manipulate the material during sewing, and control the speed and the starting and stopping of the machine accordingly, the solution was less simple.

From the beginning there was a general awareness that the time to sew a seam must be influenced by these four factors at least:

(1) The length of the seam.
(2) The maximum speed of the machine, in stitches per minute.
(3) The acceleration and deceleration of the machine.
(4) The stitch length, or stitches per centimetre.

Extensive studies of sewing were carried out on various types of seam using a tachograph, which records variations in operating speed of the machine by producing a trace on a paper tape. These studies indicated that two further factors had to be added to the above list:

(5) The number of bursts of sewing necessary to complete the seam.
(6) The degree of control, required by the machinist, of the material being sewn.

The number of bursts is significant because in garment making, seams of the same length may differ in difficulty or complexity, and therefore in work content. Generally speaking, the greater the complexity, the greater the number of bursts required. The tables of sewing values were therefore constructed to give a value per burst. Between bursts, the machinist has to handle the material in various ways, to facilitate the next burst. These movements were catered for by a special group of modules, all with codes beginning with H.

In respect of the degree of control demanded of the machinist over the material being sewn, analysis of the tachograph studies indicated that machines could be classified into two groups. The first comprised machines with folders fitted, plus certain specified machines, where control by the machinist was relatively simple. The second consisted of the remaining machines, which required a greater degree of control, and consequently had a lower effective operating speed. For coding purposes, S being the code for the sewing family, the first group became SF (*S*ew, *F*older fitted), and the second SN (*S*ew, *N*o folder fitted).

It was found possible, with statistical assistance, to develop formulae from the mass of tachograph observations. From the formulae two tables were constructed, one for SF and one for SN, each table giving the value for a burst of sewing, covering a wide range of burst lengths, stitch lengths, and machine speeds. Maximum machine speeds are used in column headings, to lead the analyst to the column appropriate to the machine being used, but all the time values in the tables are based upon actual operating speeds recorded during the tachograph studies.

The full module code is given by adding the seam length and number of bursts to the SF or SN classification. For example, SN 63 3 refers to a seam 63 centimetres long, sewn in three bursts on a machine with no folder fitted.

The module value for SN 63 3 is greater than that for SF 63 3. This is because a machinist operating an SN type of machine cannot

normally operate it at as high a speed as he could an SF type (irrespective of the purely mechanical speed capability of the machine), owing to the greater requirement for manual control of the material being sewn.

**Early experience**

The first version of GMD was subjected to extensive field trials, which revealed some weaknesses. It was necessary to increase the sensitivity of modules in some families, and to improve the quality of the module definitions. The modifications were made, and a second series of trials carried out. A few further minor alterations were necessary.

By this time it had been found that the system contained a framework of logic which enabled a GMD practitioner to read an analysis and quickly recognize obvious errors. To quote a simple example, a DNS module cannot be completed if the machinist has no scissors in his hand, i.e. DNS must be preceded by GTA. Experience has shown that system logic is an extremely valuable feature of GMD.

It had also been found that in cases of analysis by direct observation, the analyst could be relieved of writing, and thus keep his eyes on the operation for the whole of the time, by speaking the analysis into a hand-held tape recorder. This improved the rapidity of application of the system.

And so GMD took its final shape. The data comprised three sets of sewing values, and a total of 100 module values to deal with handling and manipulation. A manual was produced setting out the data, the module specifications and the logic governing the use of the system.

**Examples of analysis**

The following are two examples of GMD analyses for very simple operations:

*Example 1*

A straight seam 30 cm in length is sewn on a machine without a folder but with a fixed thread cutter. When the seam is completed the part is detached from the needle and placed into a work box.

| *Code* | *Explanation* |
|---|---|
| PNN2 | *P*lace part to the *N*eedle of a machine with *N*o folder fitted, in not more than *2* movements. |
| SN 30 2 | *S*ew, on a machine with *N*o folder fitted, a seam *30* cm long, in *2* bursts. |
| DNC | *D*etach part from *N*eedle using *C*utter fixed to the machine. |
| PL2 | *P*lace part aside to a general *L*ocation in not more than *2* movements. |

*Example 2*

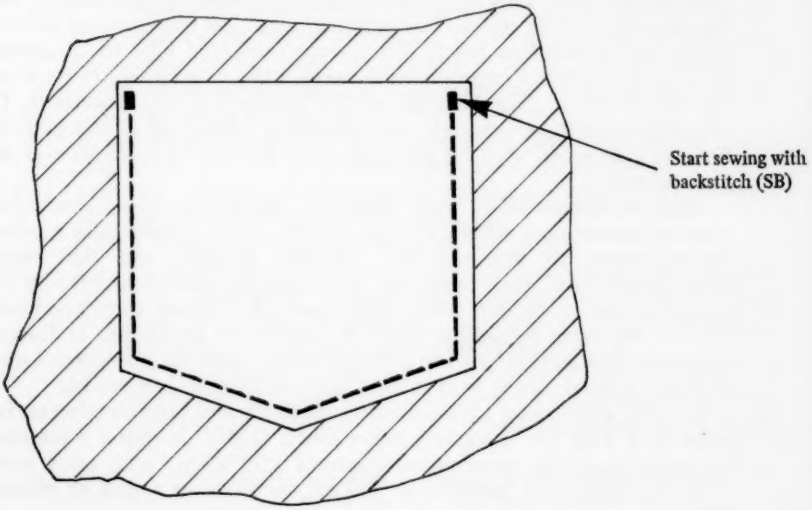
A machinist operating a single needle flatbed machine, with no folder

## HOME OFFICE O & M/WORK STUDY BRANCH
## DATA ANALYSIS SHEET

SHEET ..... OF . REF. No. ..... DATE .....
EST ..... SHOP ..... ANALYST .....
PRODUCT ..... OPERATOR .....
OPERATION ..... TOTAL VALUE .....
MATERIAL .....
MACHINE DETAILS: MAKE ..... TYPE .....
MODEL No. ..... SPEED ..... FEED .....

| NOTES | MODULE CODE | | | | VALUE | |
|---|---|---|---|---|---|---|
| FROM SHEET | | | | | | |
| forepart | P | L | 2 | | 34 | Pick up and Place forepart in general Location on machine table in not more than 2 movements |
| pocket | P | P | 2 | | 59 | Pick up and Place pocket and Position it (i.e. some precision involved) to forepart in not more than 2 movements |
| | P | N | N | 2 | 25 | Place the positioned parts to the Needle in not more than 2 movements |
| | S | B | | | 17 | Start Sewing with a Backstitch |
| | S | N | 34 | 5 | 110 | The value shown is for the total seam length of 34 cm, sewn in 5 bursts. This entry records the first burst |
| | H | A | N | | 32 | Handle; Align to forepart |
| | S | N | - | - | — | 2nd burst of sewing. Value included above |
| | S | H | | | 27 | Sew using the Handwheel to ensure that needle penetrates the material ready for the first turn |
| | H | T | | | 25 | Handle; Turn the material (1st turn) |
| | H | A | N | | 32 | Handle; Align to forepart |
| | S | N | - | - | — | 3rd burst of sewing |
| | H | T | | | 25 | 2nd turn |
| | H | L | | | 18 | Handle; to general Location (material bulk out of way) |
| | H | A | N | | 32 | Handle; Align to forepart |
| | S | N | - | - | — | 4th burst of sewing |
| | S | H | | | 27 | Sew using the Handwheel to ensure that needle penetrates the material ready for the third turn |
| | H | T | | | 25 | 3rd and final turn. |
| | H | A | N | | 32 | Handle; Align to forepart |
| | S | N | - | - | — | 5th and final burst of sewing |
| | S | B | | | 17 | Finish Sewing with a Backstitch |
| | G | T | A | | 29 | Get Tool and subsequently Aside (Scissors) |
| | D | N | S | 2 | 48 | Detach from the Needle using Scissors, 2 cuts, (top and and under side) |
| | C | T | | | 18 | Cut first Thread at beginning of seam |
| | P | L | 2 | | 27 | Place forepart to new general Location, ready to cut next thread, in not more than 2 movements |
| | C | T | | | 18 | Cut second Thread at beginning of seam. |
| aside to box | P | L | 5 | | 67 | Place forepart (with pocket now attached) to a general Location, in not more than 5 movements |
| | | | | Total BMMs = | 744 | |

fitted, is required to attach a patch pocket to one half of the front of a pyjama jacket, i.e. the 'forepart'. The shape of the patch pocket is shown below. The top hem has already been completed, and the raw edges folded under and pressed.




The GMD analysis for this operation is shown on the facing page. The handwritten notes on the left are all that need be added by the analyst to describe fully the method followed by the machinist. Notes on the right are solely for the benefit of readers of this article.

A longer operation simply produces a longer analysis; to a trained analyst it is no more difficult than these examples.

**Training**

Potential users had been kept in touch with the development of the system as it progressed, and were familiar with its broad characteristics. Now training courses for analysts were mounted. Some trainees were headquarters staff concerned with product design and development, and with cost estimation. Others were concerned with operator training, and work study staff were concerned with work measurement and method study in prison workshops. Most were Home Office staff, but a few were from other departments. In the first week of the two-week course trainees were given a thorough grounding in the theory and the logic; the remainder of the time was spent in intensive practice analysis of operations, by observation and by visualization, tackled in increasing order of complexity. Evidence so far suggests that anyone with a general

understanding of how a garment is made can learn GMD with little difficulty.

**Operational use**

In the latter part of 1976 came the first operational use of GMD in a production shop. This shop was already successfully operating a work measured incentive scheme for prisoners, but was changing its product. Before the application began, discussions were held with local management and workshop supervisors to explain the new system fully. It was also explained in general terms to the prisoners in the workshop. The elimination of the stopwatch was welcomed, and possibly compensated for any uneasiness that might have been felt at the introduction of a new practice.

Analysts encountered little difficulty during the study work. Odd cases of uncertainty about correct analysis were satisfactorily resolved by reference to the manual. Because it was the first workshop application, each operation was analysed independently by two analysts, and in almost every case identical analyses were produced. Use of the tape recording method caused no problems. It became apparent that analysing a job in GMD terms gave the observers a more intimate acquaintance with it than did traditional time study.

Regular discussions about existing methods and possible alternatives were held with the workshop supervisors. GMD provided a common language between supervisors, garment specialists, and work study staff, by making it possible to discuss methods in terms of module codes.

This first use of GMD in a workshop was a success. The analysts' confidence in it, and the consistency between results obtained by different analysts, were demonstrated in a practical way, and the attitude of the workshop supervisors was positive and encouraging. GMD eliminated the subjective judgements involved in performance rating and, by reference to the analysis sheet for each operation, it was possible easily to identify the precise method for which each job value had been produced.

Further GMD applications have since been made, without difficulty. Its greater rapidity in use has made time available for other work. No more job values have been contested than was the case with time study. Although the system was developed primarily for the garment industry, subsequent study has shown that it is equally valid for sewn products other than garments, for example pillow-slips, mattress covers, kitbags and holdalls. A beginning has been made in the use of GMD as a basis of cost estimation, production planning, operator training, and product design; all fields which offer opportunities to maximize its usefulness.

**Conclusion**

The primary attribute of GMD is that it is consistent and strikes the right balance between rapidity of application and sensitivity. This

balance could be changed to suit different circumstances; GMD was designed to operate over a wide range of products, but if the product range were narrower, it would be possible with the same number of modules to achieve a higher degree of sensitivity, albeit with a slight reduction in rapidity. Other advantages are:

(1) It enables work measurement to be performed at a rate about five times faster than conventional time study, and provides a means of measurement for work which might otherwise be difficult or uneconomic to measure. It also consumes about a third of the paper required by time study.

(2) It has a built-in method study discipline. Since the system has its own logic and each module possesses a specific work value, it provides a means of comparing working methods, and the effect of alternatives can be quickly evaluated.

(3) GMD analyses can be produced in two ways:
   (*a*) By observation—preferably using a hand-held tape recorder. The analysis is subsequently transcribed on to a Data Analysis Sheet. If no tape recording facility is available, however, the analysis may be written.
   (*b*) By visualization—enabling work values to be determined at the garment design stage and used for production planning, methods evaluation, and for developing operator training programmes.

(4) It is easy to understand and to learn; indeed analysts need have no knowledge of MTM or of any other work measurement technique.

GMD is not perfect; there are respects in which it can be improved, but these are marginal rather than fundamental. Furthermore, it has to be maintained, to keep it in accord with developments in new machinery and manufacturing techniques as they come along.

The most satisfactory conclusion from the GMD project is that it has proved quite practicable, by building on basic PMTS data, to achieve considerable agility and economy in work measurement of industrial processes, and to reap a number of other managerial advantages as by-products.

# PHOBOS—Property Holdings Overseas Business Operating System

J. M. BROWN, Foreign and Commonwealth Office

Maurice Brown is a member of the Inspectorate of Her Majesty's Diplomatic Service. —*Editor*.

**Background**

Foreign and Commonwealth Office (FCO) UK-based staff represent the overseas interests of Her Majesty's Government in 128 countries. Accommodation needs are met by what is collectively termed the Overseas Diplomatic Estate. At present this comprises some 4,600 units of office and residential accommodation at over 200 Diplomatic Posts. Financial control of the Estate is exercised through the FCO's Accommodation and Services Department (ASD) and the Property Services Agency (PSA) of the Department of the Environment, depending on the type of holding. Generally speaking, the former meets the cost of residential accommodation with short-term leases, the larger (55 per cent) and more transient part of the Estate. The latter has financial responsibility for all offices and Head of Mission Residences, and all residential accommodation owned or on long-term leases (usually over nine years). Although approximately 65 per cent of expenditure on accommodation is attributable to PSA, there is close consultation with FCO on all matters affecting the Estate. Overseas day-to-day management of both FCO and PSA property rests with the Administration Officer (AO), acting on behalf of the Head of Post, who is accountable to FCO and PSA as appropriate. FCO are frequently asked to provide statistical and other information on the Estate. Accordingly ASD must have details of every property, regardless of the responsibility, whereas PSA maintain records of only those properties under their control.

In 1969 the Duncan Report on Overseas Representation recommended, *inter alia*, that FCO and PSA resources should be combined in an Overseas Diplomatic Estate Board which would have responsibility for the total Estate. PSA moved towards this by establishing the Directorate of Estate Management Overseas (DEMOS), but a study group set up in 1971 was unable to endorse the Duncan recommendation. However, it did recommend that every effort should be made to improve the basis on which Estate management decisions were taken and an interdepartmental Working Party was formed to consider ways of implementing the study group's findings and recommended:

(*a*) That all charges should be identified to individual properties.

(*b*) That information should be recorded so that expenditure on any property could be reviewed at will and be presented to management at regular intervals.

(*c*) That the exceeding of acceptable levels of expenditure on any property should automatically be brought to management's notice.

(*d*) That regular assessments of the value of the Estate should be provided in the intervals between professional valuations to enable management decisions to be related to the value of the Estate, and make possible a system of acceptable standards for maintenance and other expenditure on any particular property.

Preliminary discussions between FCO and PSA on the implementation of the Working Party's recommendations suggested that any practicable system would be automated. The PSA section of the Estate is fairly stable in nature and detail in relation to the FCO section which is constantly changing due to the type of lease governing the properties. The differing demands on the records of the two sections made it difficult to design in the short term one system which would totally serve the requirements of both Departments. For operational reasons, PSA found it necessary to proceed with a modified design which made allowance for the mutually declared objective of merging, at a later stage, the FCO and PSA systems. The need for compatibility, and the fact that each Post manages its total estate as a single unit, made it necessary to devise a standard reporting procedure to support both systems. The numbering of properties and the coding of common data areas were developed jointly, and the existing manual procedures for both Departments were modified to embrace these new common standards in anticipation of the introduction of computer processes.

**Computerization**

By the middle of 1974 PSA had implemented their management information system (DEMOS MIS) using a British Olivetti programmable data entry terminal, model DE523 with a 4K Random Access Memory (RAM). A report on the development of PSA's system was published in the November 1974 edition of this journal.* In the early stages of DEMOS MIS development it was thought that the 4K DE523 machine would meet the combined requirements of FCO and PSA. However, it was found that PSA's needs alone occupied the 4K machine and that a similar machine would be unable to cope with the FCO's operational requirement. It was, therefore, fortunate that an enhanced version of the machine became available at that time. This offered an 8K RAM, a 2·5 Mb magnetic tape drive and a much improved compiler; and it met the FCO system's specifications which had been finalized in the light of experience gained by PSA in setting

*'Automated Management Information System for Overseas Estate' by A. Greaves and E. F. McCartney.

up and running their system. British Olivetti supplied both the hardware and software to specification within three months of receipt of the order. In the meantime, systems and operating staff were trained in the operation and programming of the equipment. This training and support by the manufacturers enabled FCO staff to develop a comprehensive operating system on the machine.

**Objectives**

The objectives on which PHOBOS was based were:

(*a*) A record for every property in the Estate, containing details of all features to which ASD desk officers might refer when making management decisions.
(*b*) A record of related annual expenditure for every FCO-controlled property.
(*c*) A record of annual expenditure on accommodation for each Post.
(*d*) Financial details on the property record file to be held in a form which would permit a continual revision of costs as a result of the worldwide movement of sterling.
(*e*) The development of computer processes which would ensure the minimum of operator intervention and the maximum of data and processing accuracy.
(*f*) An overall design which would permit a subsequent merger with PSA's system.

**System outline**

The property records file, which is up-dated quarterly through the addition of records for new properties and the amendment of existing records by revised information advised on a turn-round quarterly statement, contains the following details:

(*a*) Property type and location.
(*b*) Lease duration and nature of lease clauses with agreed rents and rates costs and frequency of payment.
(*c*) Occupant's grade and family status.
(*d*) Responsibility for and cost and location of fittings and maintenance.
(*e*) Description of property.

Property records are maintained in the order of the main mission in each country followed by subordinate posts in alphabetic code order within alphabetic country code order. Each property is uniquely identified by a property code number which incorporates the three-character country/post code and is held in ascending numeric order.

A property expenditure file contains a record for every entry on the property records file. Individual charges in Posts' accounts are identified to the appropriate property by the Post accountant. On receipt of the accounts in London the charges are verified, converted to sterling and

attributed to the appropriate record in the property expenditure file. A record of accumulated monthly sub-head charges for each Post is also constructed.

Monthly expenditure by Post is recorded on an annual expenditure file. Submission by Posts of their accounts can often be delayed, resulting in a distorted picture of the worldwide expenditure from sub-heads. Pending despatch of their accounts, Posts send a summary of monthly expenditure by sub-head on the last day of every month. These unverified figures are 'pencilled in' to the expenditure file where they are used to give approximate expenditure, and eventually overwritten by the precise expenditure on receipt of the verified Post accounts.

The month's average rate of exchange for each Post is stored on a rates of exchange file. The application of any month's or range of months' exchange rates to the currency details contained on the property records file enables ASD to monitor and/or project trends in accommodation expenditure on the whole or a selected part of the Estate.

In addition to the financial processing, the property records file can be used to analyse the Estate on any combination of property characteristics, thereby providing ASD with a very useful management tool.

During a financial year, there are 10 million character changes in the PHOBOS files. Twenty-four per cent of these up-dates are input by the operator under program control and validation. A quarter of the input is validated for range and value, and with CRT entry, visual checks can be made on the remainder, which is all numerical data, before it is written away to the files. The other 76 per cent of up-dates are performed by the computer from the keyed input, without further operator intervention. Regular monitoring of results during PHOBOS's first year's processing indicated that the error rate, attributable to operator keying, was insignificant.

All processes used in PHOBOS can be applied to the DEMOS MIS database with little modification. The design of PHOBOS has accordingly achieved all its objectives.

**Costs and staffing**

Under the manual property record system desk officers produced, as an addition to their normal duties, management and financial analyses which were subject to imprecision and delays. Property record cards for new properties were often slow in reaching ASD, and the quarterly return of amendments to extant properties' details, which were not as comprehensive as those now produced, was often submitted by only a minority of Posts. When received, these amendments were transcribed with a varying degree of accuracy onto the property record card resulting in the information on the Estate being less up to date, less precise and more expensive in manpower effort to maintain and analyse than was desirable.

Computerization, at a cost of £14,000 for the hardware and manu-

facturer-written software, has drawn together all these clerical processes, at home and abroad, under the control of a single DS Grade 9 (EO) operator/programmer. Each quarter the computer tabulates and prints the latest record for every Post's total residential estate. This list can, in the case of most Posts, be up-dated in manuscript in a fraction of the time originally taken to compile and type it. The discipline imposed by the computer has helped to standardize the quality of record-keeping and to ensure the submission of an average 98 per cent of new property records and amendments' returns by the scheduled date each quarter. In addition to extending the range of details on which amendments can be solicited, computerization makes it easy to vary that range with little additional effort either at home or overseas. All management demands on the records can now be performed promptly and reliably, and at the same time desk officers and their clerical staff have been released from what at times were laborious research tasks. The cost of the additional DS Grade 9 in ASD has been more than offset by the savings in clerical and typing effort overseas, as well as in record-keeping and analyses effort at home. The net result has been a substantial increase in efficiency in the maintenance of property records and the production of management information at an assessed saving in overall costs of £60,000 over the seven-year life of the machine.

FCO staff have developed the original system specifications and software. Comprehensive operating instructions have been written to support the interactive programs. Using these instructions under supervision, untrained staff have been able to operate PHOBOS effectively within a week of being introduced to the system.

**Future developments**

Where does PHOBOS go from here? Although it has been designed to cope with all properties in the Overseas Diplomatic Estate, machine resources made it impossible to include office and undeveloped sites on the files prior to implementation. The next stage of the system is to build a non-residential property file and then to develop further processes to cater for the management requirements peculiar to this type of property. This stage would be developed in close co-operation with PSA and during this period the question of complete compatibility, maybe even to the extent of combining both systems into one, could be resolved. PHOBOS still has untapped potential which can be developed to meet the ever-increasing demands for management precision.

# Investing in Information—Counting the Costs

Mrs. B. M. HOWARD, Civil Service Department

In the article that follows, Bridget Howard, who is Head of Library Services, Central Management Library, CSD, discusses some of the questions an organization should ask itself before setting up a new library. Mrs. Howard's regular contribution, 'Management Bookshelf', will return in its usual format in the next edition.—*Editor.*

## Introduction

'Libraries are damned expensive': how often one hears that said. It is true: libraries and similar information-handling units are costly—both in terms of manpower and of 'real' money. But since government and its agencies are increasingly concerned with the retrieval and dissemination of information, it is often expected that an organization will set up its own library. Possession of such a facility may once have been considered prestigious. In the current economic climate the investment requires very detailed appraisal, particularly since it will involve not only heavy initial expenditure but also recurring resource committal. Faced with such a prospect, management's first question should be: 'Why do we want to set up our own library?', and the second: 'How much will it all cost?' Only when completely satisfied that the expenditure will be justified should the go-ahead be given.

## Alternatives

Rather than setting up a new library, it may be more cost effective to establish links with an existing service—perhaps one dealing with the same range of topics, or one situated nearby. A useful directory for finding out what information capacities exist is the British Library's *Guide to Government Department and Other Libraries and Information Bureaux* (1976; 72 pages; £3; new edition in preparation). A more discursive survey, covering central, regional and local government, as well as NHS, facilities is given in *Government and Related Library and Information Service in the United Kingdom* by Jack Burkett (1974; Library Association; 217 pages; £4·50). Should formal co-operation prove to be a practical proposition, the necessary financial arrangements might be established either on a repayment or an allied service basis. Local circumstances will dictate whether the manpower contribution will be shared by both parties or whether one of the organizations will provide all staff—there are precedents for both possibilities.

## Assessment of functions

A vital part of the investment appraisal process is to define the *raison d'être* of the proposed library and formulate both long-term strategies and short-term tactics. If a library is eventually set up, regular reviews of these objectives must be instituted by management to ensure that expenditure remains effective. Financial decisions are not immutable: they require constant monitoring to ensure that the expenses remain commensurate with the current information needs of the organization. Most writings on the cost effectiveness of libraries are by committed information professionals. The article on 'Comprehensive Planning for Libraries' (*Long Range Planning*, October 1976, pages 48–56) is one of a rare species: an objective valuation of library administration, directed at management and written by management specialists. The authors, Jo Ann Bell and R. B. Keusch of East Carolina University, discuss the theory of the strategic planning process and relate it to their practical experience of the establishment of a new library. Among the topics covered are the development of objectives, establishing a growth strategy and determining resource requirements.

There is no uniformity in the organizational position of government libraries—some are part of the Personnel Division, others of MS or Information Groups. Similarly the person to whom the librarian reports varies from Deputy Secretary to Principal level, according to local circumstances. The P-E Consulting Group Limited in their appraisal of the Whitehall libraries (briefly summarized in *State Librarian*, March 1975, pages 2–4) commented that the librarian should be responsible to someone who has the authority, time and opportunity to make a positive contribution to the development of library services. It is, perhaps, worth suggesting that one of the senior officers, who has been responsible for assessing the justification for the setting up of the library, might subsequently be designated as the librarian's manager; he will be committed to the role formulated for the library, be aware of the alternatives and be conscious of the cost constraints.

## Costs

Library expenditure falls into five broad categories: accommodation, equipment, manpower, services and materials. These are interrelated, and a demand for an increase in the resources committed to any one may lead to enhanced expenditure on others.

When planning accommodation for any purpose, it is worth remembering that, at the current PSA opportunity cost estimate for Inner London, a filing cabinet requires nearly £100-worth of accommodation each year. The amount of space required for a library depends on the functions allocated to it by management: the minimum requirement will probably be about 500 square feet. Future demands for space additional to that originally allocated will need careful scrutiny. It is not true that a library inevitably grows in size from year to year:

bigger is not necessarily better. Libraries like gardens are often improved by judicious pruning of stock to remove dead wood.

Suppliers' catalogues will give some indication of the ruling prices for shelving, catalogue cabinets and display equipment—and to these might be added such increasingly common appurtenances as microfilm readers, photocopiers and VDUs. But as well as specialized apparatus, much of which must be bought in, current library planning calls for carpet, easy chairs, low tables and a pleasant ambience. (Some criteria are discussed in *Planning the Special Library*, published by the Special Libraries Association; 1972; 122 pages; $8·50.) To meet these requirements, the services of a designer may be needed, for example, to ensure that the lighting is balanced and of the correct intensity, that the floor loading is suitable, that sufficient electric points are provided and in the correct places; he may be called upon to advise on suitable flooring materials, colour schemes, and the erection or knocking down of internal walls. Charges for his services, and for those of painters and electricians, all contribute to the expense of setting up a library and these costs (although sometimes hidden) are nevertheless very real.

As for the staff numbers and grades likely to be required, the 'Objectives for Special Libraries', laid down by the Special Libraries Association, recommends at least one professionally qualified librarian and one clerical worker; above this it suggests a ratio of non-professional to professional staff of three to two. In practice, of course, manpower is not allocated according to a formula. It is management's responsibility to ensure that the organizational structure is appropriate to the work designated, that the number of staff is adequate, but not excessive, and that their grades are in accordance with their functions. As to a definition of tasks, *Professional and Non-Professional Duties in Libraries* (Library Association; 1974; 86 pages; £2·25) can help to eliminate some misgrading by identifying the qualities and experience necessary for different posts. There is no doubt, however, that libraries are inherently labour intensive and this fact reinforces the need for careful appraisal before setting one up. The *Ready Reckoner for Staff Costs* can give an approximation, but it is worth remembering that a library is likely to be an untypically heavy user of such facilities as stationery, telephones and postage and it is probable also to impose additional loads on common services. The total costs to the organization will, therefore, not be entirely restricted to those elements directly attributable to library staff numbers.

There are many services which a library may perform in addition to the mere warehousing and lending-out of books; these often include the issue of a list of new accessions and the answering of inquiries. If these functions are tailor-made to the needs of the parent organization and are in accordance with the objectives of the library, accountability is assured. Sometimes, however, other tasks, which are extremely costly in staff time, are undertaken without management being fully aware of the resources committed or of the justification for the activity.

Examples might be the production of comprehensive abstracts bulletins or bibliographies which are more elaborate than is justified by the organization's own needs; their origins may derive from a desire to acquire prestige or from a need perceived by the library rather than by management. It is vital that the initiation of such services, or any changes in library policy and functions, should be formally authorized by the senior officer in the Personnel Division responsible for overall resource committal. Without such control, costs attributable to library services can escalate at an alarming rate.

Finance expended on books, journals and the like is another key item in the total costs of a library. This element is, of course, susceptible to close control, both by inspection of the monthly statements of payments made and by institution of detailed investigations before preparation of the annual estimates. But management's responsibility for control of book expenses is not limited to a monitoring function. The size and scope of the library is the result of the basic strategic plan on which all other costs are based: whether the collection is intended, somewhat grandly, to be one of first resort, providing for public use copies of all texts relevant to its subject-area—or whether the library will exist merely to give local staff access to a limited range of 'core' material. The happy solution for each organization lies somewhere between these two extremes; the amount of the book fund will depend on the choice made. The first concept may produce an oversized capacity not appropriate to the functions of the parent body. The second possibility will require more modest finance, but if too much expense is spared, the service may be so circumscribed that it cannot adequately perform the functions sought by its legitimate users—and the expenditure then verges on the nugatory. The estimate for published material (and consequent demands for accommodation and manpower to process it) is also influenced by such external factors as the availability elsewhere of a range of books on the same or related topics; if access can readily be obtained, then the need to duplicate the titles may not exist and money can be saved.

## Conclusion

There is no single, simple answer to the question: 'How much will a library cost?' It is the job of management not only to decide, in the light of local circumstances, whether the setting up of a library is justified at all—but also to determine expenditure levels by a conscious choice between alternative strategies, each of which will produce both benefits and costs. Make no mistake. Information is expensive: some of it may be essential; some will be said to be desirable; some can be unnecessary. Before authorizing a considerable resource committal, management must: (*a*) investigate the alternatives; (*b*) establish the need; (*c*) count the costs; (*d*) justify the expenditure; and (*e*) balance the outlay within the cash limit and the manpower ceiling.

# Office Machines Demonstration Rooms

A decision has been taken on resource grounds to close the Office Machines Demonstration Rooms run by the Civil Service Department and Her Majesty's Stationery Office in Old Admiralty Building. However, to maintain the facility of giving demonstrations for training purposes a selection of the machines and equipment has been moved to the Civil Service College at 11 Belgrave Road, London, SW1. With the demonstration rooms on the premises it will be more practicable to include the examination and demonstration of office machines in both the basic O and M practitioners course and the follow-on modules which form an integral part of an O and M practitioner's training.

Another facility of the demonstration rooms has been that which enabled O and M practitioners in departments to visit and examine types of machines and equipment on display. The College would like to continue to allow such visits and intending visitors should contact Miss Iris Cook, Room 5/11, Civil Service College, 11 Belgrave Road, London SW1V 1RB (Telephone 01-834 6644, extension 332) to make an appointment. Responsibility for advice on the use of reprographic equipment remains with the Co-ordinator of Reprographic Services (CRS) of HMSO and inquiries should therefore be addressed to CRS (Telephone 01-606 2033, extension 58) who will make any necessary arrangements.

CSD Management Services divisions will continue to provide specialist advice and assistance on the scope for and feasibility of office machines in particular applications, and to examine demands for office machines in accordance with current provisions or on request.

**Some recently published titles**

*Introducing Economics* by B. J. McCormick, P. D. Kitchin, G. P. Marshall, A. A. Sampson and R. Sedgwick. Published by Penguin Books Limited. (Second edition; paperback; 826 pages; £3·75)

*A Handbook of Personnel Management Practice* by M. Armstrong. Published by Kogan Page Limited; price £12

*The Computer Users' Year Book 1977*. Published by the Computer Users' Year Book (932 pages; price £17.95 plus postage). Available from the publishers, 430 Holdenhurst Road, Bournemouth BH8 9AA (Telephone: Bournemouth (0202) 301130)

—*Editor.*

# Computer Installations for Government Departments

A list of all Government computers as at 1st January 1976 was published as a supplement to the May 1977 edition of MANAGEMENT SERVICES IN GOVERNMENT. Details of computers ordered during the period 1st April to 30th June 1977 are shown in the following table. No computers for administrative and general purposes (Table 1B) were ordered during the period.

| DATE OF ORDER | DEPARTMENT[1] | LOCATION | MAIN USES | MANUFACTURER[2] AND TYPE OF COMPUTER |
|---|---|---|---|---|
| **2B Computers on order for scientific and technical purposes** | | | | |
| May 1977 | MOD (Navy) | Haslar | General mathematical and scientific computations | Prime 300 |
| May 1977 | DoI | Teddington | Numerical analysis | GEC 4070 |
| May 1977 | Home Office | Staffordshire | Planning, co-ordinating and monitoring the utilization of police manpower | Ferranti Argus 700S |
| May 1977 | DOE | London | Data collection/analysis and other research projects | Prime 300 |
| June 1977 | MOD (PE) | Fort Halstead | Optical design and research | Varian 77-200 |

[1,2] Refer to supplement to May edition for Department and Manufacturer keys.

Corrigenda to August 1977 edition:

Table 2B, fourth entry, column 5—delete '2 × Prime 300' and substitute 'ICL 2970'

Table 2B, fifth entry, column 5—delete 'Varian V76' and substitute '2 × Prime 300'

# INDEX

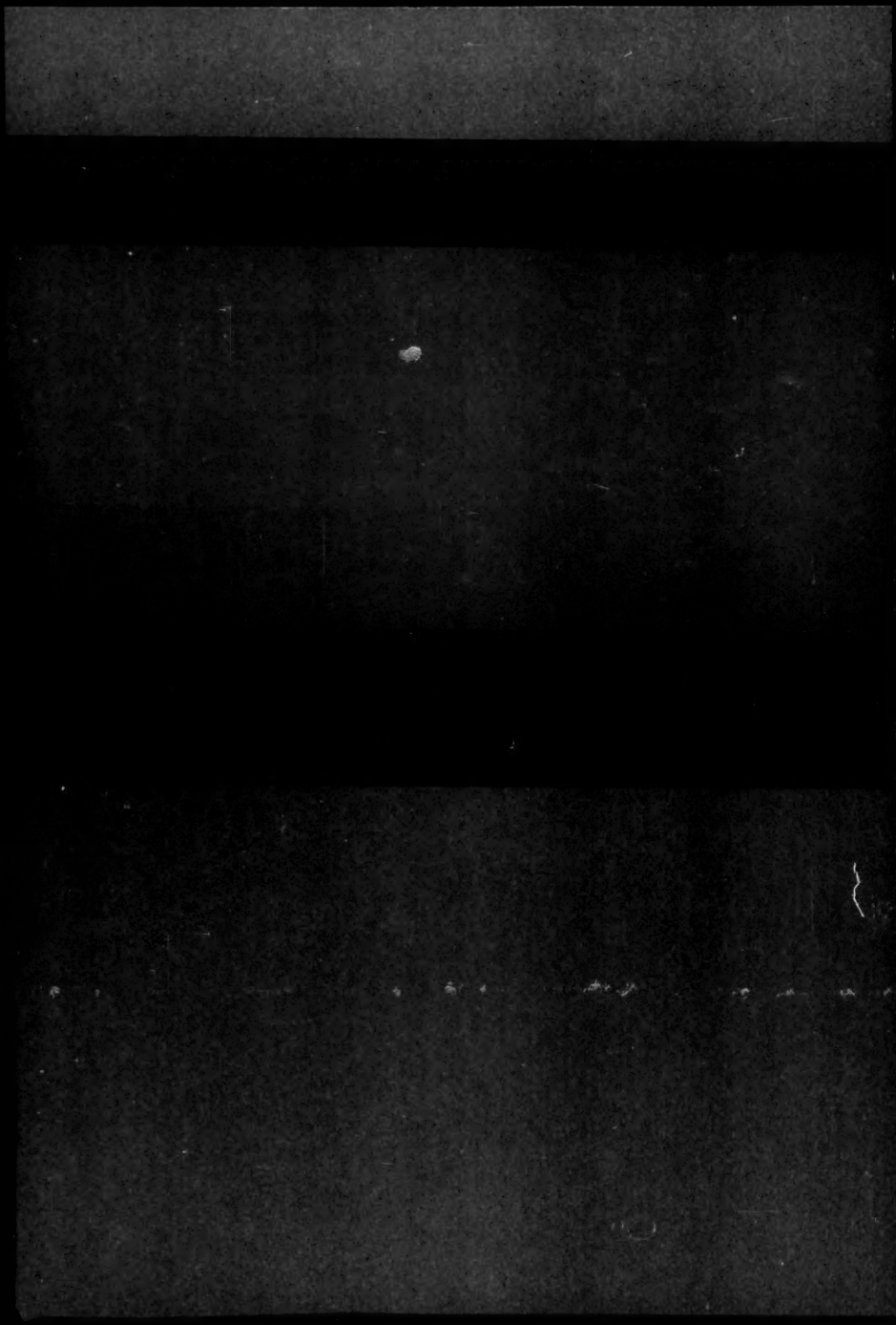
## Volume 32—1977


| | No. | Page |
|---|---|---|
| ACCOUNTING— | | |
| FINANCIAL MANAGEMENT IN THE CIVIL SERVICE—THE ROLE OF ACCOUNTANTS | 2 | 88 |
| GLOSSARY OF ACCOUNTING TERMS | 2 | 106 |
| MANAGEMENT ACCOUNTING IN THE CIVIL SERVICE | 1 | 48 |
| MANAGEMENT BOOKSHELF (MANAGEMENT ACCOUNTING) | 3 | 169 |
| THE FINANCIAL INFORMATION SYSTEMS PROJECT | 2 | 77 |
| BEHAVIOURAL SCIENCE— | | |
| BSRD—A VALEDICTORY MESSAGE | 1 | 26 |
| BOOKS— | | |
| GLOSSARY OF ACCOUNTING TERMS | 2 | 106 |
| INVESTING IN INFORMATION—COUNTING THE COSTS | 4 | 219 |
| MANAGEMENT ACCOUNTING IN THE CIVIL SERVICE | 1 | 48 |
| MANAGEMENT BOOKSHELF (COMPUTING) | 1 | 52 |
| MANAGEMENT BOOKSHELF (CONDITIONS OF EMPLOYMENT) | 2 | 113 |
| MANAGEMENT BOOKSHELF (MANAGEMENT ACCOUNTING) | 3 | 169 |
| MANAGEMENT CONSULTING IN PERSPECTIVE | 3 | 167 |
| CABINET OFFICE— | | |
| ASK A SILLY QUESTION! | 1 | 14 |
| DO'S AND DON'TS OF CHAIRMANSHIP | 2 | 61 |
| THE ROLE OF THE CENTRAL POLICY REVIEW STAFF IN WHITEHALL | 3 | 121 |
| CIVIL SERVICE— | | |
| FINANCIAL MANAGEMENT IN THE CIVIL SERVICE—THE ROLE OF ACCOUNTANTS | 2 | 88 |
| MANAGEMENT ACCOUNTING IN THE CIVIL SERVICE | 1 | 48 |
| THE PROBLEMS OF CIVIL SERVICE MANAGEMENT | 1 | 5 |
| THE RESPONSE TO THE FULTON REPORT—PART 3 | 1 | 41 |
| CIVIL SERVICE DEPARTMENT— | | |
| ADP—AUTOMATED DISTRIBUTION OF PAPERS | 2 | 101 |
| BSRD—A VALEDICTORY MESSAGE | 1 | 26 |
| OFFICE MACHINES DEMONSTRATION ROOMS | 4 | 223 |
| THE CIVIL SERVICE CATERING ORGANIZATION | 4 | 200 |
| THE MANAGEMENT REVIEW PROGRAMME | 3 | 128 |

| | No. | Page |
|---|---|---|
| COMMUNICATIONS— | | |
| CONTROLLING THE TELEPHONE COSTS OF A LARGE NATIONAL INSURANCE COMPANY | 4 | 192 |
| REDUCING EXPENDITURE ON POSTAL AND TELECOMMUNICATIONS SERVICES | 2 | 65 |
| COMPUTER— | | |
| A CAPITAL VENTURE—ESA'S COMPUTER JOBMATCHING PROJECT | 4 | 182 |
| ADP—AUTOMATED DISTRIBUTION OF PAPERS | 2 | 101 |
| COMPUTER INSTALLATIONS FOR GOVERNMENT DEPARTMENTS | 1 | 56 |
| COMPUTER INSTALLATIONS FOR GOVERNMENT DEPARTMENTS | 2 | Supp. |
| COMPUTER INSTALLATIONS FOR GOVERNMENT DEPARTMENTS | 3 | 172 |
| COMPUTER INSTALLATIONS FOR GOVERNMENT DEPARTMENTS | 4 | 224 |
| DATA PROCESSING PROFESSIONALISM—A MUST OR A MYTH? | 3 | 151 |
| MANAGEMENT BOOKSHELF (COMPUTING) | 1 | 52 |
| PHOBOS—PROPERTY HOLDINGS OVERSEAS BUSINESS OPERATING SYSTEM | 4 | 214 |
| THE COMPUTER RECORD SYSTEM AT NEWCASTLE CENTRAL OFFICE | 3 | 158 |
| COST REDUCTION— | | |
| CONTROLLING THE TELEPHONE COSTS OF A LARGE NATIONAL INSURANCE COMPANY | 4 | 192 |
| REDUCING EXPENDITURE ON POSTAL AND TELECOMMUNICATIONS SERVICES | 2 | 65 |
| SIMPLIFICATION IN DHSS | 4 | 177 |
| CUSTOMS AND EXCISE, HER MAJESTY'S— | | |
| REVIEWING A LEGAL BRANCH | 1 | 35 |
| DEFENCE, MINISTRY OF— | | |
| BRIDGING THE INFORMATION GAP | 3 | 134 |
| DOCUMENTATION— | | |
| ADP—AUTOMATED DISTRIBUTION OF PAPERS | 2 | 101 |
| ASK A SILLY QUESTION! | 1 | 14 |
| INVESTING IN INFORMATION—COUNTING THE COSTS | 4 | 219 |
| EMPLOYMENT SERVICE AGENCY— | | |
| A CAPITAL VENTURE—ESA'S COMPUTER JOBMATCHING PROJECT | 4 | 182 |
| FOREIGN AND COMMONWEALTH OFFICE— | | |
| PHOBOS—PROPERTY HOLDINGS OVERSEAS BUSINESS OPERATING SYSTEM | 4 | 214 |
| HEALTH AND SOCIAL SECURITY, DEPARTMENT OF— | | |
| SIMPLIFICATION IN DHSS | 4 | 177 |
| THE COMPUTER RECORD SYSTEM AT NEWCASTLE CENTRAL OFFICE | 3 | 158 |
| HOME OFFICE— | | |
| GARMENT MAKING DATA—A PURPOSE-BUILT WORK STUDY TECHNIQUE | 4 | 204 |

| | No. | Page |
|---|---|---|
| JOB SATISFACTION— | | |
| BRIDGING THE INFORMATION GAP | 3 | 134 |
| LETTERS TO THE EDITOR— | | |
| ASK A SILLY QUESTION! | 2 | 116 |
| REDUCING EXPENDITURE ON POSTAL AND TELECOMMUNICATIONS SERVICES | 3 | 171 |
| SIR JOHN SIMPSON | 1 | 55 |
| MACHINERY OF GOVERNMENT— | | |
| MACHINERY OF GOVERNMENT IN THE UNITED KINGDOM—MAIN CHANGES DURING 1976 | 2 | 107 |
| MANAGEMENT— | | |
| THE BASICS OF LINE MANAGEMENT | 2 | 95 |
| THE PROBLEMS OF CIVIL SERVICE MANAGEMENT | 1 | 5 |
| MANAGEMENT CONSULTANTS— | | |
| MANAGEMENT CONSULTANTS IN GOVERNMENT | 1 | 49 |
| MANAGEMENT CONSULTING IN PERSPECTIVE | 3 | 167 |
| MANAGEMENT SERVICES— | | |
| REVIEWING A LEGAL BRANCH | 1 | 35 |
| THE MANAGEMENT REVIEW PROGRAMME | 3 | 128 |
| MANPOWER— | | |
| INVESTING IN INFORMATION—COUNTING THE COSTS | 4 | 219 |
| SEO/PRINCIPAL—WHAT'S IN A NAME? | 3 | 144 |
| OFFICE EQUIPMENT— | | |
| OFFICE MACHINES DEMONSTRATION ROOMS | 4 | 223 |
| OPERATIONAL RESEARCH— | | |
| THE FINANCIAL INFORMATION SYSTEMS PROJECT | 2 | 77 |
| ORGANIZATION— | | |
| THE CIVIL SERVICE CATERING ORGANIZATION | 4 | 200 |
| THE ROLE OF THE CENTRAL POLICY REVIEW STAFF IN WHITEHALL | 3 | 121 |
| PERSONALIA— | | |
| MR. S. D. WALKER—C.B.E. | 3 | 127 |
| SIR JOHN SIMPSON—A TRIBUTE | 1 | 9 |
| PERSONNEL MANAGEMENT— | | |
| DATA PROCESSING PROFESSIONALISM—A MUST OR A MYTH? | 3 | 151 |
| MANAGEMENT BOOKSHELF (CONDITIONS OF EMPLOYMENT) | 2 | 113 |
| SCOTTISH OFFICE— | | |
| SEO/PRINCIPAL—WHAT'S IN A NAME? | 3 | 144 |

| | No. | Page |
|---|---|---|
| STAFF SUGGESTIONS— | | |
| SIMPLIFICATION IN DHSS | 4 | 177 |
| TECHNIQUES— | | |
| GARMENT MAKING DATA—A PURPOSE-BUILT WORK STUDY TECHNIQUE | 4 | 204 |
| TRAINING— | | |
| OFFICE MACHINES DEMONSTRATION ROOMS | 4 | 223 |
| TREASURY, HER MAJESTY'S— | | |
| THE FINANCIAL INFORMATION SYSTEMS PROJECT | 2 | 77 |
| WORK STUDY— | | |
| GARMENT MAKING DATA—A PURPOSE-BUILT WORK STUDY TECHNIQUE | 4 | 204 |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